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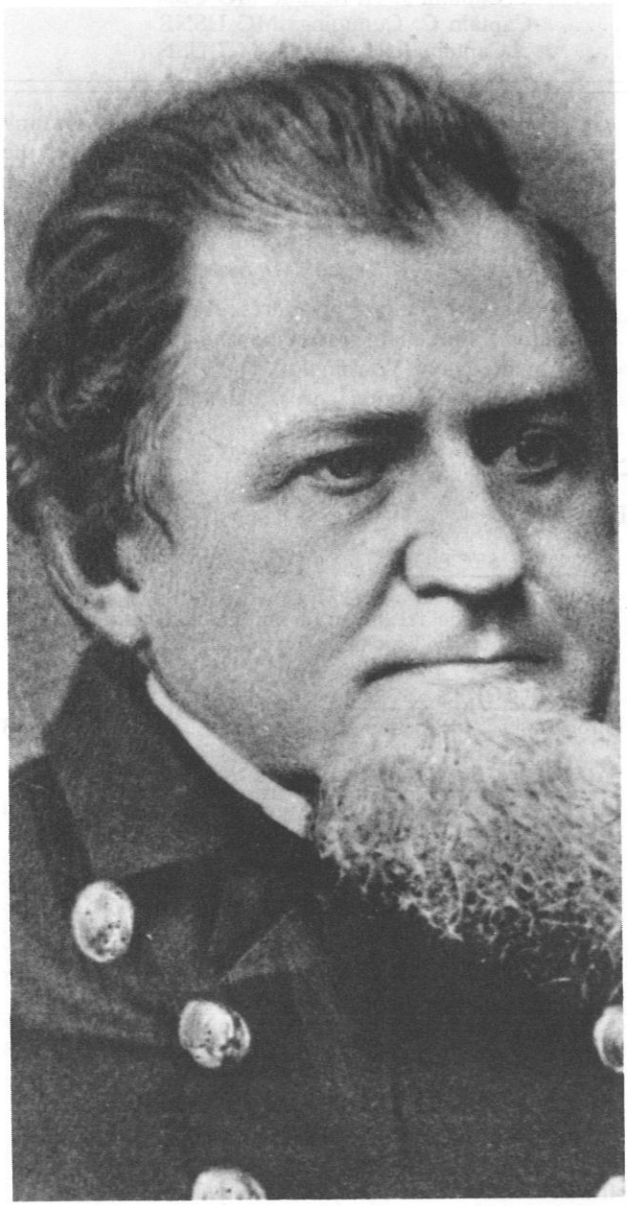
Surgeons General of the Past

(The sixth in a series of brief biographies)



Jonathan Messersmith Foltz was born in Lancaster, Pennsylvania 25 April 1810. He studied medicine under a preceptor, as was then the common practice, and at Jefferson Medical College in Philadelphia, where Doctor William P. C. Barton (see first biography in this series) was one of his instructors. Doctor Foltz was commissioned an assistant surgeon in the Navy 4 April 1830 by President Andrew Jackson. His naval career spanning three periods of active combat, was one of excitement and accomplishment. First assigned to the new frigate Potomac, his ship sailed to the East Indies to protect American commerce there from pirates. He participated in the famous battle of Quallah Batoo (1832) when that piratical stronghold on the coast of Sumatra was captured and destroyed by a landing force from the Potomac. Later, he was a trusted friend and professional adviser to President James Buchanan. Dr. Foltz acted as Fleet Surgeon with Admiral Farragut in the Civil War when Union army and naval forces attacked the forts at the entrance to the Mississippi, captured New Orleans, and conducted the western rivers campaign that led to the fall of Vicksburg. Fleet Surgeon Foltz received high praise from Admiral Farragut for his ability, devotion to duty and courage during this arduous period of service. After the war Admiral Farragut asked him to be his Fleet Surgeon again when that famous leader was honored by being sent to Europe with a specially selected squadron of American warships. After this tour abroad Doctor Foltz served as President of the Board of Medical Examiners at Philadelphia, and was appointed Surgeon General of the Navy in October 1871, serving until 25 April 1872, and died 12 April 1877. He was considered a man of superior administrative talents and great professional knowledge.

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Policy

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The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

INITIAL RESUSCITATION FOLLOWING COMBAT INJURY

CAPT Ben Eiseman MC USNR, Professor and Chairman, Department of Surgery, University of Kentucky Medical School, Lexington, Kentucky.

What is the best intravenous solution for initial resuscitation of a combat casualty? This question is being debated in Da Nang, in Washington and in many academic surgical centers. Preference for an initial resuscitation fluid has changed with each war during the past half century. In world War I it was acacia solution. In World War II it was plasma. In Korea 15 years ago, it was Dextran or type O-Rh negative blood. Although in Vietnam there is wide local option, some variant of lactated Ringer's solution with bicarbonate is commonly the first intravenous solution given a combat casualty.

Those responsible for providing initial resuscitation often do so on an empiric basis, but they, among all others, should have a sound physiologic understanding of the mechanisms involved. It is safe to predict that future advances in this unsettled professional area will come from medical officers now working at battalion and divisional level.

A. *Physiologic Responses to Hemorrhage Pertinent to Initial Resuscitation.*

1. *Acidosis.* Following major hemorrhage, inadequate tissue perfusion and resulting anaerobic cellular metabolism produces metabolic acidosis which normally overwhelms compensatory alkalinizing mechanisms.

Among the many deleterious effects of the metabolic acidosis are depression in myocardial response to catacholamines and increased sensitivity of the kidney to distal tubular necrosis.

2. *Extracellular Fluid and Sodium Depletion.* Shires (1) and Moyer (2) report an inappropriate depletion of extracellular water and sodium following hemorrhage, which may either enter the cell or in some way be firmly bound to interstitial tissues. They believe that repletion of extracellular water and sodium may be the most important objective in initial resuscitation. Moore (3) disagrees, maintaining that the reported changes are due only to inexact methods for measuring body spaces.

3. *Blood Viscosity.* Resistance to flow or viscosity of the blood is primarily dependent upon hematocrit. Hemoconcentration above a hematocrit of 45 percent sharply increases viscosity, whereas hemodilution decreases resistance to blood flow and facilitates tissue perfusion at capillary level.

Following blood loss, spontaneous hemodilution from the interstitial fluid is a slow process, as witness the unreliability of the hematocrit in quantitating recent blood loss during the first few hours following bleeding.

Hemodilution imposed by intravenous therapy will tend to improve blood flow at capillary level.

4. *Microthrombosis.* Major blood loss, acidosis, and hemoconcentration all increase the tendency of erythrocytes and platelets to aggregation and to microthrombosis. Hardaway (4) believes that such small vessel thrombi are an important element in decreasing tissue perfusion and in the pathogenesis of shock.

5. *Oliguria.* One of the major causes of death in combat casualties who survived the initial injury during both World War II and Korea was renal shutdown. Although the etiology of post-traumatic acute tubular necrosis is still unknown, acidosis, depressed renal arterial perfusion, and oliguria contribute to its production. Hemodilution and osmotic diuretics are protective against renal shutdown by promoting increased renal blood flow and dilution of urine in the renal tubules.

Hemodilution produced by replacing lost whole blood with alkalinated salt solutions obviously will achieve many of the renal protective benefits of both mannitol and sodium bicarbonate. They achieve decreased blood viscosity, improve renal tissue perfusion, and sponsor the production of large volumes of alkaline urine.

B. *Evaluation of Whole Blood Replacement.*

It seems illogical to use anything but whole blood for resuscitation following major hemorrhage, but anachronistically such may be the case.

1. *Advantages of Whole Blood.*

a) Bound by plasma proteins or by molecules of comparable size and charge, water will not leak out of the intravascular compartment so quickly as it will when given as a pure electrolyte solution. Colloid solutions compared to electrolytes are thus on a volumetric basis more efficient in keeping the vascular space full.

b) Erythrocytes have two obvious advantages in a resuscitative solution. They transport oxygen and they are enormous in size compared to either protein or electrolytes. Obviously these gigantic packages are more efficient in refilling a partially empty vascular compartment than are tiny sodium ions or even molecules the size of a protein.

2. *Disadvantages of Whole Blood.*

a) Initial intravenous resuscitation with whole blood requires either starting with universal donor type O-Rh negative blood or waiting the necessary 30 minutes for proper typing and cross match. Waiting to start resuscitation is obviously impossible with the severely injured. Universal donor blood is not without its dangers. Minor mismatches, relatively unimportant in the hydrated patient, probably contribute to a significant number of cases of acute renal shutdown in the severely injured. Whole blood also has the obvious inherent dangers of mismatch and viral hepatitis, particularly when a casualty faces enormous volumes of blood replacement.

b) Finally, the logistic problem of whole blood collection is considerable compared to the case of preparing electrolyte solution.

C. *Evaluation of Electrolyte Solutions.*

1. *Advantages of Lactated Ringer's Solution or Ringer's Solution Plus Additional Sodium Bicarbonate.*

a) Electrolyte solutions replacing whole blood loss produce hemodilution and consequent decrease in blood viscosity, thus improving tissue perfusion.

b) The detrimental effects of acidosis associated with post hemorrhagic shock are antagonized by the base (sodium) excess resulting from giving sodium bicarbonate or sodium lactate.

c) Diuresis is promoted by the water and osmotic load of the electrolyte solution with the consequent benefits in avoiding renal shutdown.

d) Water and simple salts are the essence of logistic simplicity. Sodium bicarbonate solutions store poorly, but the other ingredients of these electrolytes may be kept in powdered form or in solution.

e) Varients of sodium lactate and bicarbonate solutions provide the sodium which, according to some authorities (1, 2), are so important in resuscitation. Equal volumes of non sodium containing glucose solutions are less effective (2) than those that replace sodium in initial resuscitation following major hemorrhage.

2. *Disadvantages of Electrolyte Solutions.*

a) *Leakage.* Electrolyte solutions leak from the vascular space far more quickly than do either colloid solutions or whole blood.

b) *Required Volume.* Largely as a result of leakage, even the staunchest proponents of salt solutions admit that two or three times the volume of electrolyte solution must be given to replace a given volume of shed blood. The limits of such massive sodium solution administration have not yet been defined. Even a young vigorous soldier or Marine can be overloaded with water and sodium following hemorrhage. A patient with a fragile cardiovascular or renal system will undoubtedly have much less tolerance.

c) *Oxygen Carrying Capacity.* At some as yet undefined point following blood loss, there will occur hemodilution and anemia so severe that there is an inadequate oxygen carrying capacity of blood for the tissue. This critical point remains undefined. It will undoubtedly vary with the cardiac status of the patient.

D. *Evaluation of Electrolytes for Initial Resuscitation in Experimental Animals.*

With blood replacement alone, Dillon (2) had a 50 percent survival in rats. When he used lactated Ringer's solution, survival was improved to 75 per cent. Glucose in water in volumes equal to the sodium solution was of less benefit than either blood or the sodium containing solutions.

Shires' (1) experimental animals had a mortality of 80 percent when treated with 10 cc/kg body weight of plasma. Mortality was reduced to 20 percent when replacement was with 5 percent body weight of lactated Ringer's solution. Wolfman's (2) shocked dogs had a mortality of 80-90 percent when 25 percent extra cellular fluid was replaced with homologous blood. The same volume of lacta-

ted Ringer's solution reduced mortality to 20 percent.

The data in experimental animals support the use of sodium containing solutions, not merely whole blood, for initial resuscitation following major hemorrhage.

E. *An Acceptable Clinical Approach.*

In the face of these theoretic and still unsettled considerations, what is a good practical course for initial resuscitation of the wounded? An ideal compromise would combine all that has been of proven value in the past with what appears to be beneficial in what is new.

After obtaining a sample of blood for immediate typing and cross matching, initial resuscitation should be the prompt administration of some varient of a salt solution such as ⅙ molar sodium lactate; lacted Ringer's; or physiologic saline plus sodium bicarbonate. In a severely wounded young man, a liter of such resuscitative solution in a plastic bag container can be manually squeezed into a vein within 10 minutes. Within 30 minutes, four liters of electrolyte solution could have been administered to which should have been added 44 mEq. of sodium bicarbonate. By this time, typed and cross matched blood should be available as needed. A central venous catheter, an indwelling urinary catheter, and clinical response should dictate the vigor with which subsequent electrolyte or whole blood therapy should be pursued.

Although the maximum volume of blood loss that can be safely replaced solely with a balanced salt solution remains undefined in man, we (6) have found this critical point of critical blood loss to be between ½ to ⅔ of the blood volume in the experimental animal. Replacing each volume of lost blood with three times this volume of electrolyte solution, a loss of one-half the blood volume would require six liters of salt solution. Clinical experience confirms that this may be possible in a healthy casualty, but good judgment suggests that whole blood supplement should be instituted long before such large volumes of salt solutions alone are utilized.

Conclusions

Alkalinated sodium-containing electrolyte solutions are of proven clinical and experimental value in the initial resuscitation of the wounded. Even after major trauma and blood loss the medical officer, under usual circumstances, can probably support most casualties with such electrolyte solutions until type specific cross matched whole blood is available for more definitive care.

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More on Fluids for Resuscitation

The concern about optimal amounts of fluid for resuscitation after combat injury evident in CAPT Eiseman's article in this issue of the News Letter and in his letter which accompanied the manuscript is emphasized by CAPT T. H. Wilson, MC, USN, who has just returned after a tour of duty as the Chief of Surgery in the Repose. He comments, "It was certainly possible to overload young people. We saw marines who were plethoric and dyspneic from having been given more blood and Ringers than their estimated losses warranted. They were seen soon after wounding and, I'm sure, were simply overloaded."

It is unfortunate that guidelines for fluid replacement have not been defined clearly for man, especially for the injured man. In the hospital, monitoring can be done while patients are receiving fluid. CAPT Wilson used central venous pressure determinations and hourly urine output measurements once patients had reached the Repose, if monitoring was necessary—but of course such control is not usually feasible in the field. Consequently, caution and alertness for any signs of fluid overloading are needed.

CAPT Wilson is also deeply concerned about the "wet lung" syndrome which is accounting for some deaths of wounded men after they seem to have been stabilized. This occurs particularly when actual chest injuries have been sustained and when the body has been subjected to severe percussive injury (land mines). There may be no early real evidence of lung trauma. He reports that we are beginning to get some evidence that in trauma plasma escapes from the capillaries and we may be doing just the wrong thing to add albumin, plasmanate and whole blood to the lactate and that maybe what we should be doing is giving Ringers and red cells (e.g. frozen blood).—Editor.

CLINICAL IMPORTANCE OF THE ADRENERGIC RECEPTORS

Francois M. Abboud MD, Iowa City. Arch Intern Med 118(5): 418–421, November 1966.

The concept that cellular receptor mechanisms mediate the actions of drugs has been accepted for many years. Although the physicochemical and morphological properties of receptors in general are still poorly understood, a very active interest in the adrenergic receptors which subserve the actions of sympathomimetic amines has developed within the last decade. The increasing number of reports dealing with adrenergic receptors demonstrates that not only physiologists and pharmacologists but also internists and clinical investigators are preoccupied with this timely subject. A main reason for this sudden popularity is the recent discovery of compounds which block selectively certain cardiovascular and metabolic effects of the sympathomimetic amines leaving other effects of the amines unmodified. To the basic scientist the new blockers meant a better understanding of the mechanisms of action of adrenergic stimuli, and to the clinician they facilitated a clearer view of the pathophysiology of certain cardiovascular problems and permitted new therapeutic approaches to serious illnesses such as shock, hypertension, arrhythmias, and angina. The present discussion is a brief review of potentially beneficial effects of the adrenergic blocking drugs in clinical situations.

One may start by attempting to define a receptor. A receptor might be thought of as a cellular component which resides either on the membrane or inside the cell and which reacts or combines with a drug. This combination triggers off a series of events which culminate in the response. For example, when one stimulates the sympathetic nerve supply to a blood vessel, the neuromediator norepinephrine is released from tissue stores at or near the nerve terminal. The released norepinephrine would react with receptors in the smooth muscle cell and initiate a series of reactions ending in muscular contraction and vasoconstriction. Circulating norepinephrine also would react with the same or similar receptors to give the same response. The adrenergic receptors referred to here are those which mediate the actions of adrenergic compounds or sympathomimetic amines and which are blocked specifically by certain compounds referred to as adrenergic blockers. Other receptors, such as the ones which mediate the vasoconstrictor action of angiotensin for example, or the vasodilator action of acetylcholine are not adrenergic receptors and are not specifically blocked by adrenergic blockers.

In 1948, Ahlquist proposed that there were two types of adrenergic receptors: *alpha* and *beta*. This classification provides a useful framework within which one might think about the action of sympathomimetic amines and of adrenergic blocking drugs. *Alpha* receptors mediate vasoconstrictor responses. *Beta* receptors mediate the vasodilatation caused by some sympathomimetic amines and also the positive inotropic (increased myocardial contractility) and positive chronotropic effects of adrenergic stimuli on the heart. Levarterenol, for example, causes vasoconstriction by stimulating α-receptors in blood vessels; isoproterenol causes vasodilatation by stimulating β-receptors; and epinephrine causes vasodilatation or vasoconstriction through its effect on both α- and β-receptors in vessels. On the other hand, all three sympathomimetic amines levarterenol, epinephrine, and isoproterenol cause positive chronotropic and inotropic effects by stimulating β-receptors in the heart.

It should be emphasized that the validity of the receptor theory depends to a large extent on the differentiation between one adrenergic receptor and another by means of selective blockade. As early as 1947, Nickerson and Goodman had demonstrated that dibenamine Hc1 blocked vasoconstrictor (α-receptors) but did not block the positive chronotropic and inotropic responses (β-receptors) to adrenergic stimuli. Thus selective α-receptor blockade had been established in support of the theory. Evidence for a selective β-receptor blockade was still lacking. In 1958, Powell and Slater found that a dichloro analogue of isoproterenol (dichloroisoproterol or DCI)

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blocked the dilator as well as the positive chronotropic and inotropic effects of sympathomimetic amines (β-receptors) but did not block the constrictor effects (α-receptors) lending further strong support to the dual adrenergic receptor theory. With the discovery of DCI it could be shown also that metabolic effects of sympathomimetic amines, namely the hyperglycemia and the increased plasma free fatty acids, were selectively antagonized by the β-receptor blocker and not by α-blockers. Important cellular effects of epinephrine such as the formation of cyclic 3', 5' adenosine monophosphate from adenosine triphosphate and activation of phosphorylase also were reduced by DCI.

To the clinician an understanding of adrenergic receptors is important for the selection of the proper vasopressor agent to produce a specific cardiovascular response and for the selection of a specific blocker to antagonize an unwanted adrenergic effect. For example, certain amines such as methoxamine (Vasoxyl) and phenylephrine (Neo-Synephrine) stimulate α-receptors predominantly. Their main effect is peripheral vasoconstriction; they do not increase cardiac output and should not be used in clinical situations in which an increase in cardiac output is desired as, for example, in shock. Other amines such as levarterenol, metaraminol (Aramine), epinephrine, mephentermine (Wyamine), and ephedrine stimulate both α- and β-receptors; they tend to increase cardiac output* and may cause either vasoconstriction or vasodilatation. Isoproterenol is purely a β-stimulating catecholamine; it increases cardiac output and causes vasodilatation.

The adrenergic blockers may either antagonize the vasoconstrictor effects if they are α-blockers or block both the dilator and myocardial stimulating actions if they are β-blockers. The commonly recognized α-receptor blockers are dibenamine Hcl, benzodioxane, phenoxybenzamine Hcl (Dibenzyline), and phentolamine (Regitine). The latter has been used most frequently for the diagnosis of pheochromocytoma but its application for that purpose is gradually abandoned because of the high incidence of false positive results and the availability of more specific diagnostic tests. The use of α-blockers has been considered in several other clinical situations. Theoretically the α-blockers ought to be effective in the treatment of primary hypertension since they interfere with adrenergic vasoconstrictor stimuli. Their effects, however, are not predictable and rapid tolerance develops during their use.

In the management of shock, α-blockers offer a promising therapeutic modality. In various types of shock, peripheral vasoconstriction is often present and cardiac output is reduced. When levarterenol or metaraminol is administered in an effort to increase cardiac output, precapillary and postcapillary constrictions are enhanced as undesirable by-products of therapy. This intensified vasoconstriction has, at times, the deliterious effects of decreasing renal blood flow and urinary output, and increasing capillary filtration, hemoconcentration, hypovolemia, and producing ischemic tissue necrosis. Phentolamine or phenoxybenzamine would eliminate this peripheral constrictor action (α-receptor) with its unwanted effects without interfering with the beneficial cardiac stimulating action (β-receptor).

As one treats patients in cardiogenic or bacteremic shock, it sometimes becomes apparent that although blood pressure can be restored to acceptable levels with levarterenol, evidences of poor tissue perfusion such as decreased urinary output, cold clammy skin, cyanosis, slow capillary refill, and acidosis may persist. These patients are good candidates for the use of α-blockers. Occasionally, however, the intravenous administration of phentolamine will result in a very rapid fall of arterial pressure. Such a hypotensive response to the α-blockers suggests the lack of adequate blood volume particularly if venous pressure is low. Restoration of blood volume would be necessary, therefore, before continuing the administration of phentolamine.

Hypovolemia has been blamed also for the marked fluctuations in blood pressure seen during and after surgery in patients with pheochromocytoma. The high levels of circulating catecholamines may cause intense small vein constriction and enhance capillary filtration contributing to hypovolemia. In preparing these patients for surgery one might include, in addition to volume replacement, treatment with oral phentolamine for three or four days.

Among the adrenergic β-receptor blockers are dichloroisoproterenol (DCI), nethalide, and propranolol Hcl (Inderal). The latter is the most potent, has the least sympathomimetic side effects, and is the one available for clinical investigation. Potential clinical benefits from these selective blockers of adrenergic stimuli to the myocardium have been investigated in several clinical situations.

Nethalide was shown to lower arterial pressure in

*When levarterenol is administered intravenously to normal subjects, cardiac output will tend to fall because of reflex negative inotropic and chronotropic effects mediated through baroreceptor mechanisms. These would oppose the direct cardiotonic effects of the drug. In patients who are in shock, however, or after vagal blockade with atropine, cardiac output increases during the administration of levarterenol.

hypertensive individuals when given orally for three months. The actions of this drug were not investigated further in view of its central nervous system side effects and its neoplastic action in mice. Propranolol (Inderal) has, so far, proven to be another effective hypotensive drug and is worthy of further investigation. These β-blockers might lower arterial pressure by reducing the cardiac response to stimuli which cause transient rises in pressure. A limited number of observations suggest that a potential benefit from the use of these compounds might be expected in hypertropic subaortic stenosis.

The β-blockers have been used also to prevent arrhythmias induced by sympathomimetic amines and by cardiac glycosides in animals. The blockade of glycoside-induced arrhythmias, however, may be a nonspecific quinidine-like effect of the blockers.

A combination of both β- and α-blockers has been tried in pheochromocytoma; the β-blocker would be useful in controlling the arrhythmias and other myocardial stimulating effects produced by the released catecholamines.

Blockade of β-receptors has a possible application in the management of angina of effort presumably through reduction of the tachycardia induced by exercise. The tachycardia of exercise is reduced without significant reduction in the cardiac output response. The intravenous administratron of propranolol seems to increase the exercise tolerance of patients with angina and the chronic administration of the drug tends to reduce the incidence of pain.

In thyrotoxic patients the β-blocker nethalide did not reduce the cardiac output or the vasodilatation suggesting that the cardiovascular manifestations of thyrotoxicosis are not mediated through β-adrenergic receptors. On the other hand patients with other hyperkinetic cardiovascular states have responded to the administration of a β-blocker. Perhaps one might be able to use the response to β-blockers to separate patients who have thyrotoxicosis from those who have a high cardiac output and tachycardia from an excessive sympatho-adrenal discharge.

In summary, a working classification of adrenergic receptors has been reviewed with particular reference to the cardiovascular effects of stimulation and blockade of these receptors. The applicability of the newly developed adrenergic blocking drugs to several clinical situations has been described. Potentially, the list of diseases in which the receptor blockers might be of beneficial effect could expand to include almost any pathophysiological state in which an excessive adrenergic stimulus is involved. Trials of these compounds might be anticipated, if not already in effect, in disturbances of gut motility, in metabolic abnormalities including excessive lipolysis or glycolysis, or in attempts to modify renal excretion of cations. It should be emphasized, however, that more investigative work will be needed before the routine use of these blockers is advocated clinically and caution should be exercised in the clinical trial of these drugs since cardiac failure induced by excessive weakening of the force of contraction of heart muscle is always a serious consideration.

Generic and Trade Names of Drugs

Isoproterenol—*Isuprel, Norisodrine.*
Methoxamine—*Vasoxyl.*
Phenylephrine—*Neo-Synephrine.*
Metaraminol—*Aramine.*
Mephentermine—*Wyamine.*
Phenoxylbenzamine Hc1—*Dibenzyline.*
Phentolamine—*Regitine.*
Levarterenol—*Levophed.*

(The references may be seen in the original article.)

THE SYNDROME OF ABDOMINAL ANGINA

Eddy D. Palmer MD, Veterans Administration Hospital, East Orange, New Jersey and Henry W. Boyce, Jr., LCOL MC, Brooke General Hosiptal, Ft. Sam Houston, Texas. GP 34(3): 139–143, September 1966.

Marked arterioarterial anastomoses usually spare the stomach from signs of arterial insufficiency but obliterative arterial disease may develop in the superior mesenteric system and lead to symptoms. Pain usually appears one-half to one hour after a large meal and persists up to one or two hours. Nitroglycerin sometimes provides dramatic relief of pain in these cases. Aortography is the best method of

demonstrating narrowing of the celiac axis or the superior mesenteric artery.

The gastrointestinal tract is somewhat unique in its circulatory anatomy and physiology and its arteries demonstrate some perculiarities in their atherosclerotic manifestations. There is, first of all, a striking paradox concerning circulatory sufficiency. The arterioarterial anastomoses of the stomach are so extensive that all but one of the gastric arteries may be ligated without injuring the organ significantly and spontaneous gastric infarction is rare. When there is general systemic arterial hypotension, however, it is possible for infarction and even total gastrointestinal gangrene to develop even though the arteries are entirely normal.

Gastrointestinal Arterial Disease

The branches of the celiac axis and the two mesenteric arteries are relatively immune to Mönckeberg's sclerosis. Furthermore, sclerotic conditions elsewhere in the body correlate poorly with the degree of involvement of the gastrointestinal arteries. Brooks' study in 1906 provided impressive information on this point. Autopsy examination of 400 patients with arterial disease showed that the celiac axis and its branches were more sclerotic than other arteries of corresponding size in only 19 instances. For comparison, the figure for the pancreatic arteries was 74.

It is well to recall that, although the concept of atherosclerosis as a "general" process has been widely accepted, the disease is remarkably irregular in its distribution through the body.

Illustrative Cases

Abdominal angina is a rather difficult syndrome to deal with clinically. It invokes a valid concept—gastrointestinal pain due to muscularis propria ischemia during periods of digestive activity in the patient whose atherosclerotic gastrointestinal arteries demonstrate only borderline competence. However, pain suspected to be of this source cannot be proved to be of ischemic origin and some individuals who are found to have extensive visceral atherosclerosis at autopsy have had no such pain during life.

Case 1. A 71-year-old man, a retired lawyer, was referred because of abdominal pain and weight loss. He had had an extensive hospital work-up, short of abdominal exploration, and it had been concluded from the clinical manifestations plus the negativity of many objective studies that the probable diagnosis was carcinoma of the pancreas. The family and past histories gave no information relevant to the problem.

The pain had begun about three years previously and was mild and unpredictable at first. As time passed, it became progressively severe and, after about 18 months, a distinct pattern developed. The patient felt well on arising, regularly ate a small breakfast and spent a fairly quiet morning. One hour after lunch, a heavy, frightening ache invariably developed deep in the upper center of the patient's abdomen. Brief, stabbing pains sometimes preceded the ache. The pain quickly spread through the upper half of the abdomen, always deep "like it was in the backbone too." The pain made the patient feel weak and agitated. He would sweat and turn pale and often thought he might suddenly die. He had to lie down although this did not seem to ease the pain. After about an hour, there was gradual subsidence. The relief was exhilarating and the patient often cried over the release.

Except for weakness, the patient felt well until about an hour after dinner. The pain recurred at that time but the symptoms usually were not so severe, were briefer and were in general less predictable.

The patient had tried a great many medications, diets and spa treatments without help. He had once been placed on 0.4 Gm of codeine daily but obtained no relief. Nitrites had apparently never been tried. The patient's only help had come from starving himself and this had created an important medical problem in itself. In spite of the efforts of his family and doctors, his fear of eating had resulted in a drop in weight from 186 to 104 lb. (height 70 inches) in a period of 18 months.

Physical examination revealed severe undernutrition, feebleness and peripheral atherosclerosis. The blood pressure was normal. There were no apparent cardiac, pulmonary or renal abnormalities. The prominent abdominal aorta was not judged to be widened. There was advanced sclerosis of the retinal and temporal arteries. Peripheral pulsations were judged to be normal.

Routine laboratory studies were normal and a review of recent upper and lower gastrointestinal, gallbladder and renal films suggested no visceral disease. No aortic or other vascular calcification could be detected.

Four days after the initial interview and before any therapeutic effort was initiated, the patient suddenly died of cerebral hemorrhage.

At autopsy, the aorta, coronary arteries and renal arteries showed only mild atherosclerotic change.

Very severe sclerotic disease was found in the basilar arteries, arteries of the extremities and common iliacs. The inferior mesenteric artery appeared quite normal. The celiac axis and the superior mesenteric artery were all but occluded by severe sclerotic disease which was most striking at the immediate origin of each artery and quickly cleared within a couple of centimeters of the origin. The viscera themselves were normal.

Case 2. A 68-year-old woman had a long history of severe generalized arterial disease. She had had two previous myocardial infarctions. Three years previously, above-the-knee amputation of the right leg had been performed because of gangrene secondary to arteriosclerosis obliterans. At about the same time, a portion of the small intestine was resected because of "gangrene," apparently secondary to mesenteric vascular occlusion.

A year later, the patient developed rather vague midabdominal pain which increased in severity over the next several months. The pain, which began at varying intervals after meals, was severe, deep and aching. It slowly subsided after about an hour.

A tentative diagnosis of abdominal angina was made. The patient was instructed to rest after meals and was given a coronary artery vasodilator to take regularly four times daily. She was also instructed to take a nitroglycerin tablet sublingually as soon as pain appeared. This program relieved the abdominal distress although rather severe angina pectoris remained.

Pathology

Perhaps because of its intriguing vagueness, this syndrome has attracted considerable attention in the literature. Many interesting discussions have been offered but most of the excellent descriptions date back several to many years. Current interest seems to lie mainly in recognition of the process as a warning of imminent mesenteric arterial occlusion.

This is ordinarily a syndrome of the abdominal gastrointestinal tract in general, short of the colon. Occasionally it appears to be a problem of the stomach alone. Sedlacek and Bean confined their anatomic explanation to the mesenteric arteries. However, personal experience and the reports of others indicate that, at autopsy, both the celiac axis and the superior mesenteric artery takeoff are ordinarily severely narrowed by atherosclerotic change although the latter usually shows the greater degree of narrowing. In any case, the responsible lesions are regularly limited to the immediate point of takeoff of the artery from the aorta and a short segment beyond.

Carrière explained the syndrome simply and satisfactorily many years ago (translation): "The stomach, then, doesn't receive sufficient blood. A painful cramp is produced analogous to the painful cramp of the heart in angina pectoris and identical to that of the muscle in intermittent claudication. . . . It is a true intermittent claudication of the stomach."

Clinical Picture

The typical patient is a middle-aged or older man. There is usually physical evidence of peripheral arterial disease. Other ischemic syndromes, such as intermittent claudication and angina pectoris, may be present. Several authors have emphasized the frequency of serious accompanying heart disease. Initially the pain consists of an occasional vague discomfort which occurs after eating. It either subsides spontaneously or seems to respond to dietary restrictions or various medications. At this stage, the symptoms are remarkably nonspecific.

Eventually the abdominal pain becomes severe, frightening and distinctly periodic. It is felt as a deep, heavy ache, interrupted by cramps, over a large area through the central abdomen. It radiates only posteriorly, as a dull, deep backache. The distinctive feature of the pain is its chronology, with onset one-half to one hour after meals and gradual clearing about two hours later. This time schedule varies considerably from patient to patient. In the individual, however, the pattern, once established, tends to remain regular.

The patient usually recognizes the fact that a meal is going to cause pain and fear of such pain often leads to smaller and fewer meals. Severe undernutrition is a frequent result. In some cases, intestinal malabsorption secondary to relative bowel ischemia adds to the malnutrition. When a fat person develops abdominal angina, it is almost certain that he will not remain fat very long. The severity of the pain tends to increase progressively over weeks or months. Eventually complete obstruction of the superior mesenteric artery with bowel gangrene is a fair possibility.

Diagnosis

Physical examination of the abdomen is usually unrevealing. Even during severe pain, there is likely to be no significant finding other than gaseous distention of the bowel. Laboratory studies may show mild leukocytosis and excess fat and nitrogen in the stools but are otherwise unrevealing.

The sclerotic process responsible for the syn-

drome may represent isolated lesions fortuitously placed or it may be part of generalized arterial disease. Therefore, plain films of the abdomen may or may not show evidence of aortic and other vascular sclerosis. Barium studies of the stomach and small bowel are normal. Aortography is a dependable way to demonstrate narrowing of the celiac axis and the superior mesenteric artery and is the most useful diagnostic test even though it does not prove the cause of symptoms.

Mechanisms and Treatment

The main disagreements over the syndrome concern mechanisms of ischemia. Tedeschi believed that spasm of the atherosclerotic arteries is a prominent feature of the physiopathology. Others have been content to assume that the extra physiologic burden imposed by digestion and absorption is sufficient to overextend the functional capacity of the narrowed arteries. The latter explanation has been supported by occasional descriptions of abdominal pain brought on by physical activity not directly associated with meals.

In some cases, nitroglycerin provides immediate relief of the pain, suggesting an important spastic element. When it provides relief, nitroglycerin is the most useful form of symptomatic treatment. Often, however, nitroglycerin does not help. For realistic treatment of both the symptoms and the imminence of complete mesenteric arterial occlusion, vessel graft is proving practicable in a small proportion of cases. Unfortunately, abdominal surgery under these circumstances may of itself precipitate acute mesenteric occlusion.

(See Abstract in U.S. Navy Medical News Letter 48(11), 2 Dec 1966, "Recognition and Surgical Management of Visceral Ischemia Syndromes—Editor.

DIRECT CURRENT COUNTERSHOCK: LONG-TERM FOLLOW-UP*

Bernard L. Charms MD FCCP, Josef Edelstein MD, Alan Kamen MD and Alberto Goldbarg MD, Dis Chest 50(3): 232–236, September 1966.

The work of Lown demonstrating the ease, safety, and high rate of success in the treatment of arrhythmias by direct current countershock has been confirmed by numerous investigators. This, together with the knowledge that cardiac output is decreased when arrhythmias are present, justifies the wide use of this procedure.

Little has been reported concerning the longer range results in cardioverted arrhythmias—information that might be of value in predicting long-term benefit in these patients. It is the purpose of this paper to review our experience and analyze long-term follow-up in patients treated by this method.

Materials and Methods

Sixty-six adult patients underwent direct current countershock during the period of January, 1963 to March, 1965. Their ages ranged from the second to the eighth decade of life. They were generally in an older age group, 34 being over 60 years of age. Fifty-six had one, four had two, and six had three separate cardioversions for a total of 82 treatments. Twenty-eight had coronary artery disease, 27 rheumatic heart disease, and the remainder had other pathology or heart disease of undetermined etiology.

When the procedure was performed electively, it was carried out in the recovery room. The patients were in a fasting state and pre-medicated one hour before with an intramuscular barbiturate. Light general anesthesia, using a rapid-acting intravenous barbiturate, was preferred. Occasionally, because of the serious life-threatening nature of the arrhythmia, cardioversion was done as an emergency. It was carried out in the emergency room, or at the bedside with intravenous narcotics or barbiturates. Several patients were discharged only hours after conversion to normal sinus rhythm.

A 12 lead electrocardiogram was taken prior to, and shortly after cardioversion. The patients were monitored on an oscilloscope throughout the procedure. The Lown Direct Current Cardioverter was used with the technique described elsewhere. The earlier conversions employed 3.5 inch electrodes placed at the base and apex of the heart. However, most of the cardioversions were done with five inch anterior-posterior paddles. The energy initially used varied from 50 to 100 watts/second and was gradu-

*From the Cardio-Pulmonary Laboratory, Mount Sinai Hospital of Cleveland.

ally increased until success or inability to convert at 400 watts/second.

At first those patients with atrial fibrillation were given quinidine for at least a day before cardioversion; more recently, patients were only given quinidine starting at the time of conversion with 0.16 gm. of quinidine gluconate intramuscularly and thereafter orally as maintenance sufficient to produce an adequate blood level and avoid some of the complications reported in those cardioverted while on quinidine therapy. Anticoagulants were used in 45 patients. The indication used was chronic atrial fibrillation. Acute arrhythmias were not routinely anticoagulated. Conversion was considered successful in this series if normal sinus rhythm was restored for at least six hours after electrical countershock was applied. If the original arrhythmia recurred before this time, it was considered unsuccessful.

Results

Eighty-two arrhythmias were treated in 66 patients with 68 reversions to normal sinus rhythm (83 percent). Eighty-seven percent of those undergoing a single cardioversion converted; however, only 73 percent subjected to multiple treatments changed to normal sinus rhythm. Tables 1 and 2 outline the type and duration of arrhythmias.

There was no apparent relationship of successful conversions to the patient's age, arrhythmia, or etiology of heart disease (Table 3). Those with arrhythmias lasting over one year had a lower rate of successful conversions. Thirteen of the 34 with rheumatic heart disease had combined valvular lesions. All were successfully converted compared with 71 percent when only the mitral valve was involved, this being contrary to previous observations (Table 4). One patient could not be successfully converted for any length of time from ventricular tachycardia because of a ventricular aneurysm. Subsequent to its removal, the patient maintained a normal sinus rhythm. Two attempts in another patient with the small paddles were failures, but a third countershock five months later with the larger anterior-posterior paddles was successful.

TABLE 1—RESULTS OF CARDIOVERSION IN DIFFERENT ARRHYTHMIAS

Type of Arrhythmia	Number of Cases	Converted to Normal (Percent)
Atrial flutter	13	10 (77)
Atrial fibrillation	61	53 (87)
Atrial tachycardia	4	3 (75)
Ventricular tachycardia	4	2 (50)
	82	68 (83)

TABLE 2—DURATION OF ARRHYTHMIA AND RESULTS OF CARDIOVERSION

Duration of Arrhythmia	Number of Cases	Successful Conversion (Percent)
1 week	36	29 (81)
1 week—1 year	23	23 (100)
1 year	19	12 (63)
Unknown	4	4 (100)

Complications and Associated Arrhythmias

There was no fatality or serious complication in our experience. Three patients had first degree chest wall burns which healed without sequelae. One with an unsuccessful cardioversion developed a transient current of injury and another had a right bundle branch block after the procedure. Two had embolic phenomena associated with the procedure; one had a cerebrovascular accident 24 hours later despite anticoagulant therapy; the other, who maintained a normal sinus rhythm only 12 hours after countershock and then relapsed to atrial fibrillation, subsequently had a cerebral embolism. Both had a satisfactory recovery. Twelve had temporary arrhythmias postconversion including first degree A-V block, premature beats (atrial, ventricular, nodal), nodal rhythm, paroxysmal atrial tachycardia with 2:1 block, and A-V dissociation. None was of serious consequence. Most were felt to be due to digitalis which apparently is required in higher dosage for control of atrial fibrillation than it is for a heart in normal sinus rhythm.

Follow-up

The period of follow-up ranged from three to 26 months. Thirty-one patients (47 percent) remained in normal sinus rhythm. Thirty-two (48 percent) had reverted to the previous arrhythmia; three were lost to follow-up. With two exceptions, all patients unable to maintain a normal mechanism reverted to their original arrhythmias within three months. Those with rheumatic heart disease (64 percent) and hypertensive cardiovascular disease (56 percent) had a higher incidence of reversion to their

TABLE 3—RELATIONSHIP BETWEEN ETIOLOGY OF HEART DISEASE AND SUCCESSFUL CONVERSION

Type of Heart Disease	Number of Patients	Number of Cardioversions	Successful Conversion
Coronary artery disease	17	23	19
Coronary artery disease with acute myocardial infarction	4	4	2
Hypertensive cardiovascular disease	9	10	9
Rheumatic heart disease	25	34	28
Myocardopathy	2	2	2
No known heart disease	2	2	2
Heart disease of unknown etiology	2	2	2
Miscellaneous	5	5	4
	66	82	68

arrhythmias than those with coronary artery disease (38 percent).

Discussion

This study confirms previous work in demonstrating the ease and safety of cardioversion. However, our success rate of 83 percent was somewhat less than reported by Lown and associates and Morris and co-workers who had 91 percent and 94 percent in their series. It is not clear why our results are poorer—our criteria for success, requiring at least six hours of normal sinus rhythm after conversion, may be one factor. Several patients converted for shorter periods and were considered failures. Another reason for poorer results may be the difference in patient population. Our patients were older, had more hypertensive cardiovascular disease and coronary artery disease. However, neither our study nor previous data can correlate prognosis for successful conversion to age or type of heart disease.

Eleven patients in this series did not convert to sinus rhythm, six of whom were rather unstable clinically (four postoperative from cardiac or lung surgery, and two with acute myocardial infarction). Two died within 48 hours. One failure, in a patient with an atrial infarction, was treated with intravenous potassium chloride and spontaneously converted the next day. This suggests that patients in unstable situations who develop arrhythmias may best be cardioverted when better stability has been obtained if they can be carried over the acute episode safely. However, when the arrhythmia is of immediate danger to the patient, attempted cardioversion is certainly indicated.

TABLE 4—ETIOLOGY OF HEART DISEASE AND LONG-TERM FOLLOW-UP AFTER ONE OR MORE CARDIOVERSION ATTEMPTS*

Type of Heart Disease	Number of Patients	Failures**	Died in NSR	NSR
Coronary artery disease	17	6	2	9
Coronary artery disease with acute myocardial infarction	4	2	0	2
Hypertensive cardiovascular disease	9	5	1	3
Rheumatic heart disease	25	16	2	5
Myocardopathy	2	0	0	1
No known heart disease	2	0	0	2
Heart disease of unknown etiology	2	1	0	1
Miscellaneous	5	2	2	1
	66	32	7	24

* Three patients lost to follow-up.

** Failure to convert and reversion to the arrhythmia in less than six hours are grouped together.

Failure to convert long-standing arrhythmias is probably associated with the underlying heart disease.

When possible, digitalis is now withdrawn several days prior to cardioversion of atrial fibrillation because many of the postconversion arrhythmias appear to be due to digitalis toxicity.

Long-term success of conversion is not good. Only 47 percent of our patients have maintained a normal sinus rhythm longer than three months. Those with rheumatic and hypertensive heart disease have a higher incidence of long-term failure than those with coronary artery disease. The patients who are able to maintain sinus rhythm are benefited by the increased cardiac output and reduction in occurrence of embolic phenomena. There appears to be minimal danger associated with the procedure and the positive results outweigh the number of failures. Patients who remain in normal sinus rhythm for at least three months before recurrence of the arrhythmia are benefited by repeated countershock therapy.

Summary

Sixty-six patients were cardioverted 82 times for various arrhythmias. Eighty-three percent were successfully converted to normal sinus rhythm. Those with acute arrhythmias who were in unstable situations (postoperative and acute myocardial infarctions), and those with long-standing arrhythmias associated with severe heart disease were less likely to be converted. Complications of the procedure were minimal except for two cerebral emboli which left no significant impairment.

Forty-seven percent of patients were able to maintain a sinus mechanism during the period of follow-up (3 to 26 months). With two exceptions, those who reverted to the previous arrhythmia did so within three months. Rheumatic heart disease (64 percent) and hypertensive cardiovascular disease (56 percent) were less likely to maintain a normal mechanism than those with coronary artery disease (38 percent).

(The references may be seen in the original article.)

STEVENS-JOHNSON SYNDROME: NONSPECIFIC PARASENSITIVITY REACTION?

David B. Coursin MD, JAMA 198(2): 133–136, October 10, 1966.

The cause of the eruption in Stevens-Johnson syndrome is still undetermined and the reaction probably has a multiple etiology, having been associated with systemic bacterial and viral infections, vaccination, drug therapy, pregnancy, foods, and deep x-ray treatment. It presents a problem in differential diagnosis because it may be confused with many primary bullous eruptions, e.g., chickenpox and toxic epidermal necrolysis (Lyell's disease), and manifests itself as a component of the prodromal symptomatology in viral infections or as a hypersensitive reaction to a therapeutic agent used in treatment. Drugs are less often implicated than the disease process itself, but if it is suspected that a drug is a cause, the drug should be promptly withdrawn, supportive measures instituted, and-in severe cases—short-term, high dose steroid therapy administered. In its milder forms, the syndrome has a generally good prognosis.

Stevens-Johnson syndrome, usually classified as "a serious variant of bullous erythema multiforme." has been making headlines in lay as well as medical publications, incriminating especially long-acting sulfonamides. In November 1964, the World Health Organization published a "Drug Information Letter" pointing out the possibility of the syndrome following the administration of many commonly used drugs. A review of world literature disclosed that more than 900 articles on the subject were published between 1945 and 1965 (reports in the files of Hoffmann-LaRoche, Inc.). Despite the fact that the syndrome was first described (by Hebra) 100 years ago, its cause is still unknown; it has been reported in association with systemic infection (bacterial and viral), vaccination, pregnancy, foods, deep x-ray therapy, and *Mycoplasma pneumoniae* infection, as well as unrelated to any disorder. Proof that a specific agent is definitely linked to the eruption is difficult.

Briefly defined as "acute inflammatory systemic disease producing a spectrum of clinical patterns," it remains one of those medical mysteries in which the presumed etiologies and pathogeneses are as varied as they are uncertain. Mok and Stevens assert that

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an etiologic classification is presently impossible. The uncertainty and confusion surrounding this syndrome extends even to the nomenclature, reflected in the number of synonyms by which it is known, since its description by Stevens and Johnson in 1922. These are syndrome de Friessinger-Rendu, erythema exudativum multiforme major (majus), iris or bullosum, ectodermose erosive plurioificielle, erytheme polyforme bulleux, muco-cutaneo-ocular syndrome, dermatostomatitis, and mucosal-respiratory syndrome.

Incidence figures are inexact for the very reason of obscure etiology. From several reports the occurrence appears to be rare, especially as linked to drugs. On the other hand, some investigators believe that reported cases comprise only a small fraction of the total number and anticipate an increase in incidence with better recognition. The severe forms are rare in infancy, early childhood, and old age. Males are affected about twice as often as females. The disease is worldwide and there is no racial predilection.

Clinical Manifestations

A prodromal period ranging from one day to two weeks characterized by fever, malaise, cough, coryza, sore throat, chest pain, vomiting, muscular aches, and arthralgia in varying combinations of severity occurs in almost half of the patients. Skin and mucous membrane eruption together with other visceral involvements follow. Rapidly developing crops of symmetrically distributed skin lesions are often the initial and only detectable clinical evidence of this syndrome. Lesions, ranging from several scattered single eruptions to merging masses covering the entire skin, are more prominent around the wrists, ankles, knees, elbows, hands, feet, and face. Hemorrhage into the affected areas is common and is the cause of the focal symptom—the so-called target, iris, or bull's-eye lesion. As the disease progresses, erosion, ulceration, and scaling develop; in severe cases entire areas of the body may be stripped of epidermis along with paronychia and shedding of the nails.

Mucous membrane involvement may be equally severe and is most common in the nose and mouth but may extend into the tracheobronchial tree. Oral blisters rupture early forming a gray or white pseudomembrane; lips and gums are red, swollen, eroded, and covered with a bloody crust. The tongue, buccal mucosa, pharynx, and larynx may also be affected, making eating and drinking extremely painful. Balanitis, vulvovaginitis, and involvement of the urethra and bladder extending beyond the visible portions have been reported in the more severe attacks. Frequent ocular complications include swollen lids covered with the typical lesions, transitory purulent conjunctivitis, subconjunctival hemorrhage, iritis, iridocyclitis, panophthalmitis, and, in severe cases, erosion or perforation of the cornea. Partial or complete loss of vision may result. "Severe ocular damage has been less frequent since the advent of sulfonamides and antimicrobials."

The course of the Stevens-Johnson syndrome is stormy, with many systemic signs of toxicity—fever, malaise, dehydration, muscle and joint pains, toxemia, prostration, respiratory symptoms, arthralgia, arthritis, nausea, vomiting, abdominal pain, diarrhea, melena, urinary distress, convulsions, coma, delirium, cardiac arrhythmia, pericarditis, regional lymphadenopathy, and splenic and hepatic enlargement. Complications are common-place and include corneal ulcer, transverse myelitis, myositis, hepatopathy, thrush, septicemia, and adhesions of the eyelids. Temperatures may range from 101 to 104 F (38.3 to 40 C), 107 F (41.7 C) having been recorded.

Depending on severity, the attack may last from several days to six weeks. Recurrences or exacerbations have occurred year after year in as many as 25% of the cases.

Differential Diagnosis

Differential diagnosis is often extremely difficult. Fletcher and Harris noted only one case in 16 sent to the Willard Parker Hospital with the correct diagnosis. Because of the similarity of major clinical manifestations, this syndrome has often been confused with acute childhood contagions (i.e., chickenpox, diphtheria, vaccinia, scarlet fever, measles, meningitis, or impetigo) or with toxic epidermal necrolysis (Lyell's disease). A list of acute exanthems, their distinguishing characteristics, and tests for laboratory identification are given as an aid to differentiation (Table).

Etiology

Etiology remains the central problem. Two main theories, which exclude the large number of cases of unknown origin, have evolved.

Single Cause Theory.—Proponents of this theory believe in a single etiology, probably some infectious agent, and cite for its support the syndrome's close clinical resemblance to the acute eruptive disorders or fevers. There has been some epidemiologic evidence of contagiosity: two epidemics occurred in

Guidelines in Differential Diagnosis of Stevens-Johnson Syndrome

Disorder	Distinguishing Characteristics	Laboratory Test
Stevens-Johnson syndrome	Skin lesions are succulent, erythematous papules with "iris" or bull's-eye" lesions in innermost areas; mucous membranes of the nose, mouth, ears, vagina, rectum, and scrotum may have bullae or vesicles; partial or complete loss of vision may result from ocular lesions	None
Toxic epidermal necrolysis (Lyell's disease)	Large areas of skin become loose and peel, resembling effect of scalding	Nikolsky's sign (superficial layer of skin can be rubbed off with light pressure)
Chickenpox	Skin lesions are pruritic and progress in an orderly fashion. Bullous lesions rare on skin but common in mouth	None
Vaccinia (following smallpox vaccination)	Lesions progress in stages similar to those of original vaccination; no bullous or polymorphous erythematous lesions	Vaccination 10 to 14 days previously
Diphtheria	Grayish-white thick membrane in throat	Organism isolated
Pemphigus	Protracted course; less polymorphism and configuration	Skin biopsy shows presence of acantholysis
Pemphigoid and bullous dermatitis herpetiformis	More chronic; less mucous membrane and systemic involvement	Skin biopsy may be helpful
Bullous contact dermatitis	Location and configuration of lesions suggest external factors; no mucous membrane or systemic symptoms; history of allergy	Patch testing for allergen
Lymphoma	Occasional polymorphous skin lesions but clinical picture is sufficient for differentiation	Biopsy
Septicemia (with blebs)		Identification of infective material
Systemic lupus erythematosus (LE)	May have typical "butterfly" skin lesion; no erosive vesicular mucous membrane lesions	Skin punch biopsy; positive LE test; accelerated ESR
Herpetic stomatitis	Acutely painful lesions on borders of lips and oral mucosa, mild constitutional symptoms; lesions tend to roll with tissue	Tissue-culture isolation of virus, complement-fixation test

Turkey (one in 1852 and a second in 1896) and one in Texas in an army camp in 1918. However, efforts to isolate a specific bacterial, fungal, or viral agent have been unsuccessful or inconclusive.

Symptom Complex Theory.—A variety of infections or disease states underly this syndrome. This theory finds support in the large number of conditions with which the Stevens-Johnson syndrome has been associated.

BACTERIAL INFECTIONS.—Prodromal symptoms of upper-respiratory tract infection and tonsillitis followed by clinical manifestations of fever and skin and mucous-membrane eruption indicate an infectious disease.

A definite time relationship has been reported between the occurrence of the Stevens-Johnson syndrome and an acute or chronically recurrent tonsillitis caused by hemolytic *Streptococcus* organisms, leading investigators to believe the syndrome to be symptomatic of an infection by these bacteria. A later comprehensive study resulted in the isolation of 46 pure *Streptococcus* cultures from the nasopharnyx, blood, blister fluid, and prostatic secretion of 21 patients with Stevens-Johnson syndrome. Other

investigators have also presented strong arguments in favor of such an etiology.

Staphylococcus aureus has frequently been cultivated from the conjunctival sac, throat, and urethra of patients with Stevens-Johnson syndrome. Naturally occurring mixed flora—*Staphylococcus, Streptococcus, Neisseria catarrhalis, pneumococci* and Vincent's bacilli — always present in secondary contaminations, have been obtained in cultures of conjunctivas and skin lesions. The possibility of a tubercular involvement has been frequently mentioned in the literature, especially where Stevens-Johnson syndrome was precipitated by tuberculin injections. Stevens-Johnson syndrome has even been regarded as an atypical skin tuberculosis with the vesicobullous forms showing an abnormal tuberculin reaction.

Other organisms which have been considered as possible causal agents include *N gonorrheae, Bordetella pertussis, Salmonella paratyphi and Pasturella tularensis.*

VIRAL INFECTIONS.—The association between the syndrome and herpes simplex has been widely reported in world literature, some investigators being of the opinion that as many as one third of all cases of Stevens-Johnson syndrome are due to a herpes virus. Forester and Scott in 1958, and Pandi in 1964 demonstrated this virus from swabbings of patients with Stevens-Johnson syndrome and, at the same time, noted a fourfold increase in complement-fixing antibody titer in the blood during the acute phase of the disease. Virus-like particles seen by electron microscopy were taken from the mouths of patients with this syndrome, and positive coagulation tests were demonstrated. The theory of viral etiology is further supported by the fact that the syndrome has occurred in the initial stages of viral upper-respiratory tract infection and in viral pneumonia. The co-occurrence of Stevens-Johnson syndrome and such childhood viral diseases as mumps, measles, Asian flu, smallpox vaccination (Stevens-Johnson syndrome appearing six to ten days after inoculation) and human foot and mouth disease, further strengthen suspicions of a connection. In recent years adenovirus has been regarded as the precipitating factor in several cases of Stevens-Johnson syndrome. The presence of "virocytes" (lymphoid cells in the peripheral blood occurring only in virus diseases) in patients with the syndrome has also been reported.

Neorickettsial organisms, psittacosis, and *Mycoplasma pneumoniae* have all been observed in patients with the syndrome. Following the report of Ludlam in *Lancet,* the editor stated that valid serological proof of a clinical connection between the respiratory and mucocutaneous syndromes had been presented; if confirmed by further study now under way, this finding would be of utmost significance.

DRUG-INDUCED ETIOLOGY.—A host of drugs have been implicated in the Stevens-Johnson syndrome; some of the main classes and individual agents include barbiturates, salicylic acid and its derivatives, antitoxins, antidiabetic agents, oxazolidine derivatives, cough mixtures, chloroquine derivatives, gold salts, the sulfonamides, pyrazolone, phenylbutazone, hydantoin, phenolphthalein, thiouracil, codeine, carbamazepine, pyrvinium, amithiozone, succinimide, meprobamate, phenacetin, phenicarbazide, quinine, mercury, sulfur, chlorpropamide, belladonna and neoarsphenamine. While anti-infectious agents, i.e., penicillin, tetracycline, and tyrothricin, and sulfonamides (both long- and short-acting forms) have been particularly cited as causal agents, references have appeared in the literature as far back as 1939.

It is not surprising that this relationship, based on coincidence of administration and appearance of cutaneous symptoms, is often prematurely deduced. It is important when considering this possible etiology for Stevens-Johnson syndrome to bear in mind that the initial symptoms resemble a typical upper-respiratory tract infection—for which common therapy is either an antibiotic or a sulfonamide. In the general course of the syndrome, skin manifestations do not appear for an additional seven to ten days, often coinciding with early drug administration.

In a critical examination of the Stevens-Johnson syndrome, two investigators state,

> Numerous cases have been described following treatment with sulfonamides. In fact, since the disease frequently starts with a non-specific condition, it often happens that the child receives at that stage one or the other sulfonamide from his physician. Since the out-break then starts one or two days after the beginning of the treatment, it takes only a small step to blame it on the sulfonamide used. Perhaps this is jumping to conclusions. In some exceptional cases, it is true, it has been possible to precipitate, in an existing Stevens-Johnson syndrome, a new attack after giving the sulfonamide under suspicion. But in the great majority of cases nothing of this kind happens. Especially in our case, the same sulfonamide has been prescribed again, three months after the illness, for an ordinary tonsillitis without causing any abnormal reaction.

Further examination of the literature reveals that the Stevens-Johnson syndrome existed prior to the

introduction, for example, of the long-acting sulfonamides (1957), and even prior to introduction of short-acting sulfonamides, and that it has appeared spontaneously in many patients without a history of drug therapy.

MISCELLANEOUS CAUSES.—Many other factors have been causatively linked to the occurrence of this syndrome. These include deep x-ray therapy, vaccinations, neoplasms, collagen diseases, deodorants, cosmetics, cholesterol, various foods, vitamin deficiency, pregnancy, and contact dermatitis caused by wood of the stone pine or poison ivy. The possibility of this syndrome being an allergic process in which predisposed patients react to a great variety of agents has also been considered, although spontaneously occurring cases cannot be explained.

UNKNOWN ETIOLOGY.—The literature contains over 150 reports of cases in which no etiological connection was obvious (reports in the files of Hoffman-LaRoche, Inc.). Although these reactions must be considered to have occurred spontaneously, they did not prove to be less severe and there has been an equal number of fatalities in this group.

Treatment

In the management of the Stevens-Johnson syndrome, elimination of any underlying disease is imperative. Severe forms of the syndrome require prompt active treatment along several lines, for example, correction of fluid and electrolyte imbalance due to vomiting, diarrhea, and renal dysfunction and topical and/or systemic administration of antimicrobial agents for secondary infection, especially of the eye. High doses of corticotropin or adrenal steroids with antibiotic cover are usually indicated for short periods only. However, some investigators feel that "the course of the disease appears to be entirely independent of the type of therapy given, other than general supportive measures."

If it is suspected that a drug is a cause of the eruptions (assuming that only the one drug has been administered), therapy with the drug should be discontinued. However, clearing of the reaction does not necessarily implicate the agent, for, as is pointed out by the AMA Council on Drugs, one would have to readminister the drug to observe whether a relapse occurs—a procedure which they regard as hazardous and which they *emphatically* do not recommend.

Generic and Trade Names of Drugs

Phenylbutazone—*Butazolidin.*
Meprobamate—*Equanil, Miltown, Meprospan, Meprotabs, Sedabamate.*
Chlorpropamide—*Diabinese.*
Tetracycline—*Achromycin, Panmycin, Polycycline, Tetracyn.*
Pyrvinium—*Vanquin, Povan.*

(The references may be seen in the original article.)

MEDICAL ABSTRACTS

HISTOPATHOLOGY OF SMALL POLYPS OF THE LARGE INTESTINE

A. R. Wychulis MD, M. B. Dockerty MD, R. J. *Jackman MD and O. H. Beahrs MD, (From the Section of Surgical Pathology, and Proctology, and Surgery, Mayo Clinic and Mayo Foundation, and the Mayo Graduate School of Medicine, University of Minnesota, Rochester, Minnesota.) Surg Gynec Obste 124: 87–92, January 1967.*

Here is an informative study to extend our knowledge of the relationship of polyps of the colon to carcinoma of the colon. The authors refer to a report by Pagtalunan et al. (S.G.O. 120: 1259-1265, 1965) of a study of the histopathology of 1,000 polyps five mm or less in diameter. In 52 of these, there was severe epithelial dysplasia and in six carcinoma in situ. This stimulated this investigation of larger polyps—5-10 mm in diameter. Multiple sections of 202 polyps from 202 patients, 5-10 mm in diameter removed with biopsy forceps or with a snare at proctosigmoidoscopy were examined. Adenomatous polyps associated with a distinct typical carcinoma, diffuse familial polyposis, chronic ulcerative colitis, and fibrous tags associated with hemorrhoids were not considered. Adenomatous polyps constituted 89 percent of these, hypertrophic mucosal tags 9 percent and 2 percent were miscellaneous lesions. The incidence of adenomas with severe epithelial atypia and carcinoma in situ was five times greater than that found in the study of polyps less than five mm in diameter.

FEVER ASSOCIATED WITH JUVENILE RHEUMATOID ARTHRITIS

J. J. Calabro MD and J. M. Marchesano MD, (From the Division of Rheumatology, Department of Medicine, New Jersey College of Medicine.) New Eng J Med 276: 11–18, January 5, 1967.

The authors preface their report with a discussion of the general failure to include juvenile rheumatoid arthritis in the differential diagnosis of so-called fevers of unknown origin in spite of the fact that Still first called attention to certain distinctive pyrexial patterns (1897) and that fever has been noted in 42 to 90 percent of almost 1,000 reports in the literature since 1958. They began a long-term study in 1958 of a group now numbering 150 of young people with rheumatoid arthritis and, in this article report particularly on the nature and character of the fever associated with the disease.

Fever (rectal temperature 100° F. or higher) was observed in 42 (84 percent) of their carefully evaluated patients. Twelve (24 percent) had high fever and 30 (60 percent) low grade fever. Of 18 who had fever before articular manifestations, 12 had acute, 5 polyarticular and 1 monarticular forms of onset. Hyperpyrexia (105° F. and above) occurred only in the 12 children with acute onset and invariably preceded polyarthritis. In these, the mean time lag was two years (three weeks to nine years) and high fever appeared to correlate with the occurrence of rash, lymphadenopathy, splenomegaly, and marked leukocytosis.

Low grade fever occurred in 21 of 23 children with polyarticular and in 9 of 15 with monarticular rheumatoid arthritis. There was no fever in six with monarticular and in two with polyarticular disease.

Characteristic febrile patterns are discussed—intermittent (quotidian) and often hectic. Acetylsalicylic acid was usually effective in abolishing low-grade fever, but variable in its effect in high fever. The many and varied febrile patterns associated with juvenile rheumatoid arthritis add to the diagnostic dilemma posed by the disease, particularly in its early stages, but hectic hyperpyrexia associated with other characteristic systemic features should alert the clinician to the possibility, particularly in children with high fever of unknown origin when other potential causes have been ruled out, say the authors. Too often these children are needlessly treated with various antibiotics and subjected to exhaustive and fruitless diagnostic studies, and even laparotomy.

PERCUTANEOUS CATHETERIZATION OF THE PERICARDIUM

Björn Nordenström, (From the Department of Thoracic Radiology, Karolinska Sjukhuset, Stockholm, Sweden.) Acta Radiol 4: 662-670, November 1966.

Introduction of a roentgen-opaque polyethylene catheter into the pericardium (pericardial cavity)

was carried out successfully in dogs and then in four patients. The author feels that this has several advantages as compared with pericardial puncture with a needle to aspirate fluid in impending cardiac tamponade: a catheter makes it possible to control continuously further hemorrhage or other fluid in the pericardial cavity and may save the patient a pericardiotomy; the patient can be placed in different positions for effective evacuation of fluid; local administration of drugs is possible through the catheter. He describes his technique in detail using local anesthesia. For increased safety, he advises the use of roentgen television during the procedure.

THE RISK OF ADRENAL CORTICOSTEROID THERAPY IN FAR-ADVANCED CANCER

H. W. Schell MD, (From Uncas-on-Thames Hospital, Norwich, Connecticut.) Amer J Med Sci 252: 641-649, December 1966.

"The benefits of steroid therapy in patients with terminal cancer seem far to outweigh the slight risk of untoward reactions" is the author's conclusion after his investigations. He compared the records of 100 consecutive patients dying with cancer who were treated with steroids with 100 consecutive patients dying with cancer who received no steroid therapy—complete post-mortem examinations were made in all. No attempt was made to assess duration of survival in each group as steroid therapy was used in the more desperately ill patients. He lists the nonspecific effects, production of euphoria, appetite stimulation, the creation of a sense of well-being, and, in some instances, a decrease in narcotic requirements as the desirable and valuable effects. Possible undesirable effects including ulcerogenic properties, increased susceptibility to infections, diabetogenic properties, pulmonary embolization, and sodium retention, all were considered. He found an increased incidence of peptic ulcer and its associate complications in the group treated with steroids and a two percent increase in bacterial endocarditis but terminal gastrointestinal hemorrhage from all causes, esophagitis, pulmonary infection, tuberculosis, pyelonephritis, diabetic complications, pulmonary embolism, and edema were not significantly different in incidence in the steroid and nonsteroid-treated groups.

SURGICAL DUODENAL ULCER—A DISEASE ENTITY?

Gastroenterology Abstracts and Citations 1 (11): 1568, Nov 1966. (E.) Buckwalter, J. A. (State U. Iowa Coll. Med., Iowa City) and L. Raterman. Arch Surg (Chicago) 93(1): 154–160, 1966.

A statistical study was made of the records of 700 patients operated upon for duodenal ulcer to test the hypothesis that duodenal ulcer is a common clinical denominator of an unknown number of disorders and not a single disease entity. The main groupings were in terms of the 4 chief indications leading to surgery: a) perforation, b) intractability, c) bleeding, d) pyloric obstruction. Sex-differentiated patients were listed under the chief indications in each one of the following categories: 1) age, 2) chief complaint of patient, 3) pain pattern, 4) other symptoms and patterns, 5) duration of symptoms prior to surgery, 6) disability, 7) gastric analyses, fasting and histamine, 8) blood grouping. Some of the more salient findings from these cross comparisons were: patients with intractable ulcer fell into the youngest age group; those with pyloric obstruction into the oldest age group. Patients with bleeding ulcer had the shortest symptomatic period before surgery; those with intractable ulcers had the longest period. Long-term prognosis seemed best in patients operated on because of bleeding, and worst in those operated on for perforation. It also appeared that the male:female ratio of ulceration was 5:1; perforation in men was twice that in women. The male patients were younger, had symptoms longer before operation, more frequently had typical ulcer pain, bled less often and less severely than women.

PREOPERATIVE RADIATION FOR ADVANCED MALIGNANT TUMORS

W. E. Herbst MD, R. N. Cooley MD, and A. T. Ozarda MD, (From the Department of Radiology, the University of Texas Medical Branch, Galveston, Texas.) Amer J Med Sci 252: 603-618, Nov 1966.

This comprehensive review of the subject, "Preoperative Radiation for Advanced Malignant Tumors" appears in the Progress in Medical Science section of the November issue of The American Journal of Medical Sciences. Abstracting it is really not very satisfactory for the abstractor nor really completely fair to the authors since practically every paragraph includes important information. Reading of the entire article is highly recommended.

The authors discuss general considerations of the subject and experimental studies before proceeding to detailed reviews of gathered information of preoperative radiation for malignant tumors of the body of the uterus, breast, esophagus, lung, rectum, urinary bladder, ovary, kidney (mixed tumors), oro- and hypopharynx, and of osteogenic sarcomma. Possible effects on the cure rate, incidence of local recurrences, and long-term palliative effects are considered. They feel that preoperative radiation therapy has a small but definite place in the overall therapy of malignant tumors and they emphasize that a well-conceived plan for both the radiation therapy and the ensuing surgical treatment, a spirit of cooperation between the radiation therapist and the surgeon, and a proper selection of cases are essential for its successful use.

Seventy-four references are cited.

PERITONEAL AMMONIA LEVELS IN ACUTE INTRA-ABDOMINAL DISEASE—A REAPPRAISAL

A. R. Mansberger Jr. MD, (From the Department of Surgery, University of Maryland School of Medicine, Baltimore, Maryland.) Amer J Surg 113: 37-43, January 1967.

In this paper, the author presents his and his colleagues' total experience to the present time regarding the usefulness and limitations of the determination of the level of peritoneal fluid ammonia as an adjunctive diagnostic measure in acute intra-abdominal disease. He has concluded that in patients with acute abdominal disease, elevations of ammonia levels above 3 micrograms per milliliter in peritoneal fluid suggest the presence of strangulated, perforated, or lacerated small or large intestine, perforated gastric or duodenal ulcer, or urinary extravasation. The derivation of ammonia in the animal body, he states, is from many sources but the bulk of it occurs in the gastrointestinal tract by putrefactive processes involving the fecal flora and by the action of intestinal urease which is bacterial in origin. Thus the peritoneal fluid ammonia content should be elevated in any condition resulting in the transudation or spillage of intraluminal intestinal content into the peritoneal cavity—arterial strangulations, perforations, traumatic puncture or laceration of large or small intestine. Elevation of peritoneal fluid levels of ammonia associated with perforations of a gastric or duodenal ulcer occurs because of the ammonia content of gastric juice resulting from urease activity on the specific substrate urea. The bulk of ammonia formation in the kidney results from the action of glutaminase or glutamine in synthesizing ammonia. No elevations of peritoneal fluid ammonia levels above 3.0 micrograms per milliliter were found in any patients with pancreatitis evaluated in these studies but amylase content of peritoneal fluid was found significantly elevated in patients with pancreatitis, perforated duodenal ulcer, and in strangulated small bowel with and without perforation.

False negatives in patients with perforated duodenal ulcers and in a few patients with gangrenous bowel may occur, he explains, when the ulcer has sealed and chemical irritation of the peritoneum has resulted in sufficient dilution to lower ammonia values, when edema has resulted in pyloric obstruction and gastric contents do not traverse the pylorus and duodenal perforation, or when the gastric level of ammonia is low at the time of perforation.

MYOCARDIAL REVASCULARIZATION: IMPLANTATION OF INTERCOSTAL ARTERY

C. W. Pearce MD, A. L. Hyman MD, P. Brewer MD, P. E. Smith MD, and O. Creech Jr. MD, (From the Department of Surgery, Tulane University, School of Medicine, New Orleans, Louisiana.) J Thorac Cardiov Surg 52: 809-812, Dec 1966.

The authors report a technique for revascularization of other parts of the myocardium than that which can be reached by implantation of the internal mammary artery or when the internal mammary artery cannot be used. An intercostal artery was used in dogs in the investigations and because it appeared to be effective for myocardial revascularization, one was used in three patients: in one because there was complete occlusion of the left subclavian artery proximal to the origin of the internal mammary (only an intercostal pedicle was used), and in the other two, double implantation was done by placing the internal mammary artery in the anterior part of the left ventricle and an intercostal pedicle in the posterior portion of the left ventricle—all three patients have improved.

(Other modifications, particularly implanting the internal mammary artery in retrograde fashion in the posterior left ventricle are described in the discussion of this report—Editor.)

TREATMENT OF HYPERTENSION WITH ANTIHYPERTENSIVE DIURETIC DRUGS

R. L. Wolf MD, M. Mendlowitz MD, Julia Roboz BS, and S. E. Gitlow MD, (From the Circulatory Physiology Laboratory and Hypertension Clinic of the Department of Medicine, and the Andre Meyer Department of Physics, The Mount Sinai Hospital, New York, N.Y.) Amer Heart J 72: 692-697, November 1966.

In this review, mercurial diuretics, benzothiadiazine and phthalimidine diuretics, carbonic anhydrase inhibitors, aldosterone antagonists, and unsaturated ketone derivatives of the aryloxyacetic (phenoxyacetic) acid diuretics are listed as diuretic drugs which have been used in the treatment of hypertension. The authors describe the physiologic mechanisms involved in sodium chloride transport, sodium-for-hydrogen exchange, sodium-for-potassium exchange, and water reabsorption by the kidney and these are related to the action of the antihypertensive diuretic drugs.

Of the two groups of drugs employed frequently at present, benzothiadiazine and phthalimidine diuretics, and the aldosterone antagonists, it appears, say the authors, that aldosterone antagonists (spironolactone) which have few side effects and significant antihypertensive activity have some advantages over the benzothiadiazine and phthalimidine diuretics in the treatment of hypertension.

INTRAOPERATIVE AUTOTRANSFUSION—A PRELIMINARY REPORT AND NEW METHOD

CAPT R. H. Dyer Jr. MC USAF, (From the Department of Surgery, Strong Memorial Hospital, University of Rochester School of Medicine, Rochester, New York.) Amer J Surg 112: 874-878, December 1966.

The author points out that autotransfused blood has qualities of true compatability, ready availability, and economy, it does not cause allergic reactions and is free of disease transmitted by serum; that it is especially valuable when no blood or limited blood is available for a patient and for those patients, who because of religious beliefs, will not accept blood other than their own. (Some, of course will not accept delayed reinfusion of their own blood.) He describes the equipment which he has used and presents autotransfusion for consideration in elective or emergency surgical and obstetrical cases when anticipated or unanticipated hemorrhage occurs as an immediate safe means of salvaging and reinfusing the patient's own blood.

ANNOUNCEMENT

FIRST ANNUAL TRAUMA SERIES
U.S. Naval Hospital, Portsmouth, Va.
Friday, 10 March 1967
0900—Hospital Auditorium

TOPICS

0900 Changing Concepts of Treatment of Injuries to the Nervous System—Dr. A. Earl Walker, Baltimore, Md.

0930 Problems Peculiar to Combat in Viet Nam—Dr. John T. Purvis, Birmingham, Ala.

1000 Management of Penetrating Wounds to the Head—Dr. Arnold Mierowsky, Nashville, Tenn.

1100 Closed Head Injuries—Dr. Arnold Mierowsky, Nashville, Tenn.

1145 Penetrating Wounds to the Spinal Column—Dr. William H. Druckemiller, Erie, Pa.

1215 Closed Injuries to the Spine—Dr. William H. Druckemiller, Erie, Pa.

1415 Peripheral Nerve Injuries—Dr. James L. Thomson, Norfolk, Va. and Dr. Frank B. Clare, Portsmouth, Va.

1515 The Use of Antibiotics in Injuries to the Central Nervous System—Dr. John Utz, Richmond, Va.

1600 Panel Discussion—Dr. A. Earl Walker, Baltimore, Md.—Moderator.

1900 Dinner at Officers' Club, Norfolk Naval Shipyard, Portsmouth, Va.

DENTAL SECTION

CLINICAL AND HISTOLOGICAL EVALUATION OF GINGIVAL MASSAGE IN THE TREATMENT OF CHRONIC GINGIVITIS

By C. Simaan DDS PhD and M. Skach MD PhD.

The role of gingival massage in the treatment of gingivitis and periodontitis has been a subject of considerable discussion in the dental literature.

Although statements supporting the use of gingival massage are mentioned by many authors, some arguments have been raised against its use.

Most statements and arguments are mainly dependent upon clinical observations. To clarify the value of gingival massage, there is still need for a scientific assessment. For this purpose a clinical and histological study has been carried out to throw more light on this problem.

Cases of chronic gingivitis and of chronic hyperplastic gingivitis were treated and followed. Sixty patients were included in this study; 46 of them were followed clinically and histologically, and 14 of them were used to compare the effect of brushing and the interdental stimulator. The period of checkup ranged between 2 and 12 months.

The method of treatment included removing calculus and other local irritants. Gingival massage by the toothbrush and interdental stimulator was carried out by the patients themselves. Before starting the treatment, the patients were instructed to brush three times daily using a modified Stillman's method, followed by the use of the interdental stimulator once daily.

To evaluate the method of treatment, the following procedures were carried out in the experimental group.

Clinical checkup, clinical photograph and histological examination were carried out before treatment and after treatment.

It was observed in this study, that removal of calculus and other local irritants brought about an improvement in the gingival tissues in the majority of cases, but rapid and subsequent accumulation of plaque and bacteria makes this healing picture a temporary one.

Clinical and histological evaluation of gingival massage by toothbrush and the interdental stimulator was studied in 60 cases. In 46 cases a clinical and histological study was carried out. Fourteen cases were used to compare the effect of tooth brushing and the interdental stimulator. The method of treatment included scaling and gingival massage by brushing and the interdental stimulator. No other factors were corrected. No drugs were used. The period of checkup ranged between 2 and 12 months.

Clinical results revealed that gingival massage effected a complete recovery of gingival tissues in 45 cases out of 60. It failed in 15 cases to produce complete recovery. Best clinical results were seen in cases where the main etiological factors are local and where inflammatory edema is prominent in the involved gingival tissues. The effect of massage is either limited or poor in cases where systemic factors lower the resistance of gingival tissues such as in dilantin intake patients and in fibromatosis gingivitis, or in cases where the local etiological factors needed further procedures to correct them. Clinical results obtained from the group used for comparison have shown that although the use of brushing produced improvement in the state of the gingiva, the use of the interdental stimulator is a great adjunctive aid in the treatment of chronic gingivitis.

Histological results showed that the effect of gingival massage on the epithelial surface is very limited since improvement of keratinization was not seen in the majority of the cases. Histologically the main response of gingival tissues was reflected in the great diminution of round inflammatory cells in the connective tissues. Remnants of inflammatory cells in nest-like form were seen in every case after treatment.

(Abstracted by CAPT Perry C. Alexander DC USN, 5th Marine Div, FMF, PAC.

DENTAL ASSISTANT TRAINING PROGRAM FOR THE ECONOMICALLY DISADVANTAGED

The Dental Assistant Training Program at the U.S. Naval Hospital, Oakland, California, in conjunction with the Title V Work Experience Program (Economic Opportunity Act), has been a great success. The dental technician shortage has been intensified by the Vietnam conflict and has forced the staffing level of technicians to an unrealistic low level. To augment the dental assistants selected, trainees were chosen from the Title V Work Experience Program. At this time, all of the trainees have completed over three months of on-the-job training which consists of chairside assistance to the dental officer, formal lectures, and demonstrations. It is anticipated that after a year of training, these girls will seek and find positions in local civilian dental offices.

This program is very gratifying in that it affords constant chairside assistance to naval dental officers during the training period. While this Navy need is being fulfilled, it is also greatly contributing to the Title V Work Experience Program.

Other dental facilities of the U.S. Navy are also active in this same program.

REAR ADMIRAL CHANDLER HONORED

RADM Alfred W. Chandler DC USN (Ret), former Assistant Chief of the Bureau of Medicine and Surgery (Dentistry) and Chief of the Dental Division, received an honorary membership in the American Dental Association.

The honorary status, presented at the 107th annual ADA convention in Dallas, Texas is the highest award given by the association. "An honorary member of the ADA is an individual who, because of outstanding contributions to the advancement of the art and science of dentistry, has been elected to that select membership by the House of Delegates on the nomination of the Board of Trustees." *

RADM Chandler was also named president-elect of the American Academy of the History of Dentistry at the academy's annual meeting also held in Dallas.

GREATER NEW YORK DENTAL MEETING DECEMBER 5-9, 1966

On the opening day of the 42nd annual Greater New York Dental Meeting, a team of U.S. Naval Dental Officers presented a complete review of the Navy's preventive dentistry program. CAPT Francis P. Scola DC USN presented the results of three-agent SnF_2 treatment after 6, 12, 18 and 24 months, in the clinical study conducted at the U.S. Naval Submarine Medical Center, U.S. Naval Submarine Base, New London. CAPT Carl A. Ostrom DC USN reviewed the many supporting Navy studies, from safety through development of the self-preparation method, to definitive studies on enamel uptake of tin and fluoride ions. RADM Frank M. Kyes DC USN described the Navy's all-out program, illustrated its benefit in the fact that dental caries has been virtually stopped at the U.S. Naval Academy, when a Midshipman's expectation of having a new cavity is now about once in ten years, as opposed to the average college student who has about two new caries lesions per year. After relating this to the slow rate with which communal waters are being fluoridated, and the fact that earlier NaF caries prevention was relatively unaccepted because the four treatments were too expensive, Admiral Kyes challenged the dental profession to find ways to provide the benefit of three-agent SnF_2 cariostasis annually to everybody.

*ADA American Dental Directory 1966 page R126.

DISPOSAL OF PRECIOUS METAL SCRAP

Manual of the Medical Department, Article 6-166 refers to the Defense Disposal Manual (DSAM 4160.1) as the source of instruction for proper disposal of precious metal scrap. Since this directive has a limited distribution and a recent change (No. 7) affects disposal of precious metals, the following abstract of the instructions is published as guidance for all dental activities.

1. *Dental Scrap.* Precious metal scrap (silver amalgam scrap, precious metal bench grindings, sweepings, and polishing residue) derived from the practice of dentistry, will not be sold locally but will be accumulated and disposed of, as appropriate in accordance with the following instructions.

2. *Reporting and Disposition of Silver and Amalgam Scrap.* A continuing requirement exists in the

Navy for silver to be used in the manufacture of silver cell batteries. Accordingly, silver and silver scrap will be reported by letter to the Supply Officer, Naval Ordnance Plant, Forest Park, Illinois 60130. Frequency of reports will be based on individual generations, using as a norm 100 troy ounces or when accumulations are considered large enough to warrant the expense of shipment. NOP Forest Park will furnish disposition instructions within 30 days (CONUS) or 45 days (overseas) for all items reported. Where the NOP rejects the material or does not furnish disposition instructions within prescribed limits, reporting activities will dispose of it as prescribed for gold and platinum. Shipments will be made on a nonreimburseable basis.

3. *Accumulations.* Shipment of precious metal scrap will be made semiannually or upon accumulation of the minimum quantities outlined below, whichever occurs first:

Gold or Platinum	10 troy ounces
Gold Alloy	20 troy ounces
Silver or Silver Amalgam ...	100 troy ounces

In the case of dental laboratories having large, regular accumulations of precious metal scrap, shipments will be made each three months or upon accumulation of 50 troy ounces of gold or platinum or 500 troy ounces of silver, whichever occurs first.

4. *Packaging and Shipment.* Material will be packed in nonporous, smooth containers (glass not acceptable) in such a manner as to preclude the possibility of loss through leakage or container damage. Grindings or sweepings will not be packed in paper or wooden containers as loss would occur through particle adhesion. Containers will not exceed 100 pounds gross weight, and will be clearly marked to indicate the type(s) of scrap contained therein. Safe-guards will be maintained at all times to prevent loss or theft. Shipment will be made by the most economical means available, consistent with safe transit and delivery. Parcel Post shipments will be registered. Precious metal shipments will be accompanied by shipping documents which indicate the net weight of each item to the nearest ounce (troy or avoirdupois). Shipping documents will cite the Defense Disposal Manual, DSAM 4160.1 as authority for shipment. Two advance copies of each shipping document will be forwarded to the consignee.

5. *Gold and Platinum Scrap.* Precious metal scrap will be shipped as follows:

Activity Location	Consignee
East of the Mississippi River, Puerto Rico, Virgin Islands and Atlantic overseas area.	Property Disposal Officer U. S. Naval Air Station Lakehurst, New Jersey 08733
West of the Mississippi River (except Alaska, Hawaii, Washington, Oregon, California, Nevada and Pacific overseas area).	Property Disposal Officer Pueblo U. S. Army Depot Pueblo, Colorado 81001
Alaska, Hawaii, Washington, Oregon, California, Nevada and Pacific overseas area.	Property Disposal Officer U. S. Naval Supply Center Oakland, California 94614

NURSE CORPS SECTION

PROGRAMMED INSTRUCTION

A relatively new method of teaching called Programmed Instruction is gaining wide acceptance in nursing education as well as in other specialized fields and general education. CDR Florence K. Job NC USN, Chief, Nursing Service, U.S. Naval Hospital, Charleston, South Carolina, one of the Navy's few nurse programmers, has authored a course entitled "Nursing Care of the Patient with a Myocardial Infarction." Space does not permit publication of CDR Job's course in this printing, however, some of her comments about programmed instruction follow.

The basic method employed in Programmed Instruction is that information is presented in small steps and the learner is allowed to progress at his own rate as illustrated in the following question:

You would expect the patient with a myocardial infarction to complain of pain in his Turn to page

a. Chest 5
b. Hand 12
c. Muscles 9

If the learner selects the wrong answer he is told why the answer is incorrect and is directed to restudy the question and select another answer. When he selects the correct answer he is given additional information. He is not allowed to stare passively at a page; he must be actively involved.

Among the many obstacles with which nursing staff education have to contend are the time element, assembling personnel for class, and providing knowledge to the students according to their level of comprehension. Programmed instruction can make the same information available to all individuals without gathering them in a group and, in addition, allows them to absorb knowledge at their own rate of learning. The subject matter can range from TPR procedures to care of the patient with epilepsy. The patient can also benefit from this type of instruction. Programmed information has already been published for patients with diabetes. Programmed instruction is a tool which we do not at present possess, but one which is well worth investigating for use in our nursing staff education programs.

The greatest challenge in programming, according to CDR Job, lies in the principle of this method, namely; if the student hasn't learned, the teacher hasn't taught.[1]

1. Job, Florence K. "Programmed Instruction—A Tool for Staff Education Departments"—Paper submitted as part of a course in Programmed Instruction at the U.S. Naval Base, Great Lakes.

AEROSPACE MEDICINE SECTION

SCIENTIFIC ADVISORY TEAMS IN ANTISUBMARINE WARFARE

The Scientific Advisory Teams are relatively new additions to "the ASW team." Although small in size, each of the four teams is making its contribution to the ASW effort in the area of human behavior studies. The four teams are assigned to the staffs of:

- Commander Antisubmarine Warfare Force, U.S. Atlantic Fleet
- Commander Antisubmarine Warfare Force, U.S. Pacific Fleet
- Commander Fleet Air Wings, U.S. Atlantic Fleet
- Commander Hunter Killer Force, U.S. Atlantic Fleet.

The mission of the Scientific Advisory Teams is to provide staff support to their respective commanders through systematic study of the impact of human behavior on ASW sensor capabilities aboard ASW platforms and fixed systems, and conversely, the impact of sensor-platform environments upon behavior.

Scientific Advisory Teams are composed of Aviation-Experimental Psychologists in the Medical Service Corps. The teams had their beginning in 1962 with the assignment of a small team of psychologists from the School of Aviation Medicine, Pensacola, to Task Group DELTA under the Commander, Fleet Air Wings Atlantic. Current expansion from this initial effort now results in the four teams.

The Scientific Advisory Team with Commander, Antisubmarine Warfare Force, Atlantic, has been designated the lead team for coordination of the overall program in human performance research within the ASW Forces. Chain of command relationships upward and downward flow from Force to Fleet Commanders to the Chief of Naval Operations, where evaluation studies are assigned and priorities are established for the investment of study effort.

Generally, the Scientific Advisory Teams are assigned to the Analysis Divisions of their respective Commanders' staffs. Here they work closely in a multidiscipline approach with military and civilian analysts, representatives of many Navy evaluation groups, and contract researchers.

Research approaches by the Scientific Advisory Teams are both applied and theoretical. The operating forces provide the "laboratory setting" for studies to produce here-and-now answers pertaining to human behavior and performance in current ASW operations. Effort in longer range, theoretical studies will be expended as time and personnel permit, in cooperation with Navy laboratory activities such as the Submarine Medical Research Laboratory, New London, and the Naval Aerospace Medical Institute in Pensacola, Fla.

Major Research Goal

One major research goal of the Scientific Advisory Teams is to develop an ASW personnel-performance data bank which will complement the operational data bank being established for the ASW data library. This personnel data bank will contain personnel-profile characteristics determined to be significant predictors of successful performance on sensor systems and platforms in the operational environment. It will also contain sensor-operator and sensor-team performance criteria. Data to be accumulated in the bank will be useful in relating human behavior dimensions to operations in the evaluation of overall ASW performance. It will also be useful in such areas as classification, training, assignment, and retention of ASW personnel.

Members of the Scientific Advisory Teams have participated in many studies in various ASW problem areas concerning behavior and performance. Codes and formats have been designed for tabulation and collection of operational information for subsequent rapid machine processing. Criteria have been identified which help increase the accuracy in measuring and evaluating operational performance. Design proposals have been submitted for command and control systems. Effects of crew instability have been documented in continuing studies of Atlantic VP crew turnover problems. Analyses of Jezebel operator and analyst performance have led to improved training, evaluation, and operator efficiency in these areas. Analyses of personnel assignment stability aboard destroyers are now being conducted. Findings from these and comparable studies provide immediate data for command consideration and information input to the behavior data bank. In addition to behavioral studies, members of the Scientific Advisory Teams also perform duties as assigned within their respective commands.

The Common Denominator

Numerous requirements exist for a flow of timely, objective, personnel and behavioral data from the operating forces. The success of tactics, current weapons systems, and future advanced systems remains dependent upon the people who employ them. If we are to muster all of our assets in matching the ASW team against the ASW problem, emphasis upon the importance of people deserves constant repetition, and analysis of their behavioral performance deserves constant attention. The common denominator in ASW, for us and for the potential enemy, is human behavior. We must not only contend successfully with the behavior of the enemy, we must also keep alert in contending successfully with our own behavior.

Our electronic-mechanical sensors, sensor systems, and platforms are complexly designed for specific capabilities under given operational and environmental conditions. They cannot attain maximum capabilities by themselves. People and human behavior are required to complete the systems and man the platforms. Combinations, qualities, and quantities of integrated behavior determine positioning on a continuum between the two extremes of sensor-platform efficiency and "down gear" ineffectiveness.

Our sensor operators, maintainers, supervisors, and decision makers are also complexly designed. They too possess specific capabilities. They are also integrated sensor systems, with each being different from the other. They function best within prescribed behavioral limits which may be categorized as individual and group, subjective and objective. Exceeding these limits by frequent detractions from primary duties, multiple responsibilities, prolonged excessive performance requirements, training deficiencies, etc., may result in varying degrees of "down people." Fine gear will not work without fine people. "Down gear" and "down people" do not mix or contribute to ASW problem solution. As illustrated in figure one, either of four conditions could feasibly exist at any given time or through periods in time. To support our commanders in the achievement and maintenance of condition IV, figure one, the Scientific Advisory Teams are devoting attention to people, to individuals, small-group teams, and organizations. The search is on to isolate those personal, organizational, and environmental factors which tend to stimulate and distinguish the more effective behavior in sensor-system performance.

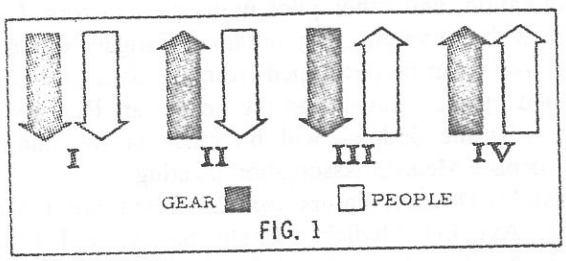

FIG. 1

"The ASW team" is composed of a variety of unique and distinct teams related by common purpose. Team members maintain intense personal identifications and loyalties with their particular systems, platforms, and missions as they continuously strive for readiness and for solution to their portions

of ASW problems. To the "good hunting" challenge, the Scientific Advisory Teams sound the call to "think people" as they concentrate on ASW behavior.—AeroMed, BuMed.

AEROSPACE MEDICAL BIODATA TEAM—VISIT TO AIRWING DURING COMBAT OPERATIONS

A multi-disciplinary mobile team was established under the sponsorship of CNO and BUMED and conducted its first project aboard an Attack Carrier operating in combat against heavily defended targets in North Vietnam during October and November 1966. The team was supported by the Naval Medical Research Institute for logistic and laboratory services, by the Aerospace Medical Department, Naval Air Development Center, Johnsville, Warminster Pennsylvania for biochemical analysis of blood serum samples, and the Office of Naval Research (Dunlap and Associates on contract) for measure of pilot carrier landing precision. In addition, the techniques of instrumenting and in-flight recording developed by the NASA Flight Reserve Center, Edwards, California were utilized to collect in-flight EKG, respiration and acceleration on jet pilots flying combat attack missions. Computer analysis by FRC of these data will be correlated with interview information, blood and urine steroid findings and landing precision during combat and non-combat operations. The Office of Bio-Sciences, NASA Headquarters, Washington, D.C. provided research funding support for related laboratory experimentation.

It is proposed that the Team collect stress and control data as necessary and conduct a longitudinal study of the naval aviation combat operational environment and the aviators, in order to quantify flight related fatigue (both acute and cumulative), mission motivation, and other pilot motivation factors. It is hoped that a valid, easily obtained Fatigue Monitoring Index can be developed from the data to be obtained by the team during the next year. Reports of the scientific findings will be made at the annual Aerospace Medical Association meeting.

BUMED coordinators for the Team are Codes 523, Aviation Medicine Flight Safety, and Code 513, Aviation Operational Psychology.—AeroMed, BuMed.

NEW MOVIE FOR FLIGHT SURGEONS

A new movie film entitled "Medical Investigation of Aircraft Accidents" has recently been completed and will soon be available through the Medical Officers, COMNAVAIRLANT and COMNAVAIRPAC, and from Naval Aviation Training Film Library and Marine Corps Aviation Training Aids Section. The number of this 20-minute color, sound movie is MN-10217.

The film vividly depicts the administrative, medical and pathological investigative procedures which are performed by Naval Flight Surgeons in their investigation of aircraft accidents, and participation as members of the Aircraft Accident Board convened in accordance with OPNAV Instruction 3750.6 (series).

The Aeromedical Department, Naval Aviation Safety Center, were technical advisors. The film features LT B. Tabor MC USN (NAS, Oceana) and CDR Walter D. Gable MC USN (Naval Aviation Supply Center) playing true life parts as themselves, and a star studded supporting cast of budding actors. (Well done!)—AeroMed, BuMed.

AIRCREW PROTECTIVE EQUIPMENT MEETING

A meeting on Aircrew Protective Equipment was held at the Naval Aerospace Medical Institute, Naval Aerospace Medical Center, Pensacola, Florida from 1-3 November 1966.

Twenty-six commands were represented by seventy-seven Flight Surgeons, Aviation Physiologists, enlisted technicians and civilians currently engaged in physiological training, research, development, test and evaluation of aircrew protective equipment.

The agenda included Advanced Oxygen Systems, Flight Helmets, Flight Suits, Pressure Suit Development, Flash Blindness Equipment, Improved Ejection Seat Systems, Survival Radios, Water Survival Gear, Anti-exposure Suits, Biotelemetry, Sound Attenuation Problems in Flight Helmets, and Modification of Physiological Training Devices.

The purpose of the meeting was to provide field personnel with information on current developments in the vital area of aircrew protective equipment. Discussions dealt primarily with methods of improving fleet support, safety, and pilot and aircrew performances through better training in the use of existing equipment, and continuing efforts to advance future design concepts.—AeroMed, BuMed.

NEW NAVAL FLIGHT SURGEONS' MANUAL

The completed manuscript for the "Naval Flight Surgeons' Manual" has been sent to the Government Printing Office and the galley proofs for a majority

of the twenty-one chapters have been returned for final editing and proofreading. This manual, which is being jointly sponsored by the Office of Naval Research, Chief of Naval Operations and the Bureau of Medicine and Surgery, should be ready for distribution by the end of fiscal year 1967. It will be used as a major text in the flight surgeon's course at the Naval Aerospace Medical Institute, Pensacola, Florida, and in the correspondence course "Aviation Medicine" administered by the Naval Medical School. This book, which is to be printed as a "hard-backed" volume, will also be an excellent reference text for practicing flight surgeons and aviation medical examiners. It will be available for general purchase from the Government Printing Office. —AeroMed, BuMed.

NAVY SUPPORT OF NASA SPACE FLIGHT PROGRAM

The participation of the Naval Medical Department in the Nation's Manned Space Program continued with active support given to Project Genimi Missions 10, 11 and 12. Several Flight Surgeons, undergoing residency training in aerospace medicine, performed duty as medical monitors for the flights while a number of naval medical officers and hospital corpsmen served on surgical teams aboard naval vessels deployed in the recovery fleet. In addition, several naval medical officers are assigned to the medical evaluation team which conducts the pre- and post-medical examinations of the astronauts. The Naval Hospitals at Subic Bay, Philippines and Yokosuka, Japan go on an alert status for each space mission to receive the astronauts in the event of incident. The Naval Hospital, Bethesda, Maryland had a special medical team on the alert for GTA-12 Mission. This team stands by for worldwide deployment by air, if necessary.—AeroMed, BuMed.

AVIATION AND SPACE MEDICINE

Extra Vehicular Activity Studies for Project Gemini. At the request of the National Aeronautics and Space Administration a three-man team from the Physiological Sciences Department (Naval Medical Research Institute, Bethesda, Maryland), recently visited the Environmental Research Associates Company at Randallstown, Maryland to assist in these studies. Astronaut Aldrin (who has since been co-pilot of Gemini 12) was monitored for metabolic rates, respiratory rate, heart rate and EKG under simulated conditions of the gravity-free state. Post flight measurements were planned for comparison with the pre-flight readings.—AeroMed, BuMed.

PHYSIOLOGICAL ASPECTS OF OXYGEN POISONING AT PRESSURES GREATER THAN ONE ATMOSPHERE

Navy submergence scientists refer to the pathological effects of breathing oxygen at increased partial pressures as "oxygen poisoning". These effects are noted in individuals who breath hyperbaric oxygen, but are related both to the O_2 partial pressure and to the duration of exposure.

The pathological effect seen in oxygen poisoning consists of convulsions, which may be preceded by twitchings of the face. These effects are seen only in the submerged individual or in the individual in a compression chamber, simulating submergence. Symptoms noted immediately prior to onset may include: nausea, dizziness, dyspnea, anxiety, and confusion, and incoordination. Usually consciousness is lost at the onset of the convulsions, and apnea occurs during the event. The convulsion may last for one or two minutes, and in the submerged individual, drowning may occur as a result. Breathing usually resumes spontaneously after the convulsion but the patient remains unconscious for several more minutes. A period of 30 to 60 minutes of semiconsciousness then ensues with irrational behavior, great restlessness, and intermittent sleep.

The physiological mechanism of production of oxygen poisoning is poorly understood. However, it is known that at O_2 partial pressures greater than one atmosphere, so much O_2 is carried in solution in the blood that the tissues have a higher O_2 concentration and less O_2 is removed from the hemoglobin. A hypercapnia results which causes cerebral vasodilation with increased blood flow to, and thus increased oxygenation, of the brain. It is believed likely that the oxygen also has a direct effect on enzyme systems in the brain, thus causing the convulsion, but the definitive work on this subject in humans remains to be done. Zirkle,[1] Mangel, Harton and Ruffy (1965), showed that in mice, exposure to O_2 at high pressure resulted in lipid peroxidation in the brain, associated with decreased brain acetylcholinesterase activity. The postulated sequence of events leading to the clinical symptoms of O_2 toxicity based upon the work with mice is as follows:

1. Formulation of lipid peroxides in the brain with tocopherol inhibiting the reaction (tocopherol deficient mice are more severely affected).

2. The formed lipid peroxides then inhibit acetylcholinesterase in brain.

Treatment consists of bringing the individual up to the surface, while preventing him from drowning. The convulsion itself usually is not immediately fatal, but may cause death by drowning if the mask is displaced during the seizure.

To delay the onset of oxygen toxicity, the aviator should remain perfectly still during rescue operations after the rescuers are made positively sure he is alive.

As an illustration, the Navy Diving Manual gives an average oxygen consumption rate of 0.30 liters/minute (STPD) for "sitting quietly", while the same rate "swimming at 0.85 knot" is 1.4 liters/minute, or over 4 times as great a consumption.—AeroMed, BuMed.

1. Zirkle, L. G., et al. Studies of oxygen toxicity in the central nervous system. *Aerospace Medicine* 36: 1027, 1965.

ACKNOWLEDGMENT

In the U.S. Navy Medical News Letter 48(12): 19-23, 16 December 1966, article entitled "Emergency Underwater Escape from Aircraft" by C. L. Ewing MC USN, the following correction has been received:

Under the heading "Underwater Ejection", page 23, third paragraph, second sentence, the parenthetical phrase should be deleted in accordance with NAVSYSCOMREPLANT message 051744 October 1966. At the time of writing, this message was not available to the author.

EDITOR'S SECTION

THE GLOBAL MEDICINE PROGRAM AT THE NAVAL MEDICAL SCHOOL

"The quality and extent of medical training today determines the characteristics of patient care tomorrow", said CAPT John H. Stover, Jr. MC USN, Commanding Officer of the Naval Medical School, National Naval Medical Center, Bethesda, Maryland. "The present global distribution of military personnel has accentuated the need for preparing medical officers to cope with associated unique and rapidly increasing medical problems. The Global Medicine Program of the Naval Medical School has been developed to meet this requirement," explained CAPT Stover.

Designed to provide medical department personnel with an orientation toward and instruction in military medicine, the Global Medicine Program is being developed under the leadership of CAPT Stover assisted by CAPT Julius M. Amberson MC USN (Ret).

In those instances where scheduling permits the transportation of personnel to the Naval Medical School, specialized curricula are developed and presented to meet their particular needs. For individual officers who can arrange for a period of study at the Naval Medical School a "Global Medicine Resources Center" has been established. In cases where assignments preclude the possibility of extended study at the Naval Medical School, "packaged" courses of instruction making up the Global Medicine Synopsis Series are available.

The curricula developed to meet the training requirements for particular military medical assignments consists of a variety of specialized courses. For example, Southeast Asia-bound MILPHAP (Military Provincial Hospital Assistance Program) teams receive a tailor-made curriculum consisting of a series of lectures designed to indoctrinate the students in such important topics as geography, geopolitics, and medical aspects of counter-insurgency. These teams are engaged in supplying badly needed medical services to civilians in Vietnam and assist in improving hospital plants, sanitary conditions and practices. Having just completed a tour of duty at the Quang Tri Provincial Hospital, located south of the Demilitarized Zone in Vietnam, LT Robert C. Butler MSC USN, of the Special Projects Training Division, Academic Department, is charged with the responsibility of designing such indoctrination courses within this phase of the Global Medicine Program.

Similar programs, adapted to their particular needs, have been prepared for special surgical teams for Vietnam as well as courses for medical personnel bound for Antarctica, and are presented annually.

Within the Global Medicine Resources Center, four self-instructional carrels have been established which will contain the latest in training aids. A com-

pact 8 mm cartridge-type rear screen projector will be used for viewing single-concept teaching films. Video-taped lecture playbacks will be available on a special tie-in from the Naval Medical School's Television Studio. The most up-to-date, slide-sound synchronization equipment will be installed in each booth. Binocular compound microscopes will be available for study of microslides. In addition, possibilities are being explored for including access to Computer Assisted Instruction, location of particular patients in the continental limits of the United States, and a computerized locator service to all photo, microscopic slide, and entomologic specimen collections at the Naval Medical School.

Besides the "hardware" available to the student, each booth contains many reference texts and brochures covering various aspects of operational medicine. Other references are also available within the Resources Center. If further research is desired, the Edward Rhodes Stitt Medical Library of the Naval Medical School is but a few steps away.

Effectiveness of any training program may be gauged by the quality of its instructional materials. In order to maintain highest quality in the Resources Center, a special staff will be at work at all times. Headed by a Technical Informational Specialist in Medical Science (assisted by an Educational Specialist in visual aids), the staff is charged with the task of providing a constant flow of professional and technical information into the Resources Center. They will be involved in continuous reading, analysis, and searching of numerous sources, for example, formal scientific journals, audio-visual materials, and abstracts. They also consult with appropriate medical specialists when necessary. The object of their work is to acquire all pertinent data on a given topic under study. New findings are especially important, and will immediately be included in the instructional materials. In this way a great gap is bridged; namely the time between uncovering new knowledge in medical research and its eventual application in the field.

Finally, the "Global Medicine Synopsis Series" is a group of compact refresher courses presented in convenient package form. Such courses are to be made available to all Naval Hospitals and Naval field medicine training schools for use in the training and indoctrination of doctors ordered to Southeast Asia. Diseases indigenous to the tropics, unusual diseases not generally found stateside, are covered in this series; for example, schistosomiasis, dengue, relapsing fever, and amebiasis. Since the doctor is not likely to have encountered these diseases before, stress is placed on familiarization with symptomatology, diagnosis, and accepted treatment.

In addition, the first unit of the series deals with subjects which are new and very important to the young Navy doctor—problems he will encounter in a field hospital company or a collecting and clearing company. Casualty transport, medical logistics, field medical practice, and environment are all included.

Actual contents of a typical "package" consist of a kinescope recording and a loose-leaf book of instructional materials; in effect a self-contained "mini-library". A manuscript of the Kinescope recording is included. It is edited for oral presentation with accompanying slides, which are also furnished in the package. A wealth of other textual material is included such as articles concerning World War II experience with the given disease, recent publications, and bibliographical references. In short, the package makes available vital supporting material —almost the equivalent of medical library research already completed.

Many experts from various Naval medical activities have contributed invaluable assistance to this program. Civilian experts have also contributed much to the program. Professional and technical consultants from universities and other government agencies have generously given much of their time and talent in compiling, composing, and counseling. Practicing physicians have permitted reprints of their research papers to be duplicated and included as supplementary instructional materials. In addition, interservice support for the program has been remarkable. Army, Air Force, and Marine Corps Officers have contributed time, energy, and materials from the backgrounds of their diverse training and experiences.—Public Affairs Office, NNMC, Bethesda, Maryland.

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